Estd.1917

PATNA UNIVERSITY

NAAC Accredited B+ Grade

Letter No.Acad/131/AKS/22 Dated: 07-01-25

To

1. The Dean, Faculty of Science/Social Science/Humanities, Patna University
2. The Programme Director-cum-Head,
   MSW programme,
   Department of Sociology, Patna University
3. The Head, Department of Economics, Patna University
4. The Head, Department of Urdu, Patna University
5. The Head, Department of Physics, Patna University
6. The In charge, I. T. Cell, Patna University

Subject:- Regarding approval of the syllabi.

Sir/Madam,

I am directed to inform you that the syllabi as mentioned below are approved vide the resolution of the meeting dated 17/10/2024 of the Academic Council taken vide it agenda AC.24.2.2 except syllabus of Analytical Clinical Biochemistry for B.Sc. Chemistry, semester-IV received vide the letter no. nil dated 02.03.2024 of the Head, Department of Chemistry, Patna University which needs some modifications:-

(i) Revised CBCS syllabus of Master of Social Work received vide the letter no.67(Soc) dated 14.03.2024 of the Head, Department of Sociology, Patna University,

(ii) Revised syllabus of M.A. Economics received vide the letter no.Eco/28/24 dated 15/03/2024 of the Head, Department of Economics, Patna University,

(iii) Revised syllabus of M.A. Urdu received vide the letter no.99/UR dated 20/03/2024 of the Head, Department of Urdu, Patna University,

(iv) Revised syllabus of M.Sc. Physics received vide the letter no.Physics18/2024 dated 25/01/2024.

The In charge, IT Cell, Patna University is requested to upload the above-noted approved syllabi and this letter on the University website. The approved syllabi

as mentioned are being sent on the official emails of the concerned Heads and In charge, IT Cell, Patna University.

Enclosure:- Approved syllabi of MSW,
M.A. Economics, M.A. Urdu and M.Sc. Physics

Yours faithfully,

04.01.25

Deputy Registrar
Patna University, Patna

YLLABUS FOR M.Sc. IN PHYSICS

UNDER

CHOICE BASED CREDIT SYSTEM (CBCS)

(To be effective from 2024)

[Estd.: 1917]

UNIVERSITIES OF BIHAR
&
PATNA UNIVERSITY

OUTLINE OF THE CHOICE BASED CREDIT SYSTEM (CBCS) for PG degree courses:

It consists of a number of courses i.e. **Core Course (CC), Elective Course (EC), Discipline Specific Elective Course (DSE), Ability Enhancement Courses (AEC), and Ability Enhancement Compulsory Courses(AECC).** Each course is equivalent to a paper. The nature of these courses is defined below.

1.1 Core Course (CC):

A course which should compulsorily be studied by a candidate as a core requirement on the basis of subject of MSc studies and is termed as a Core course.

1.2. Elective Course (EC):

Generally a course which can be chosen from a pool of courses (Basket) and which may be very specific or specialized or advanced or supportive to the subject/ discipline of study or which provides an extended scope or which enables an exposure to some other subject/discipline/domain or nurtures the candidate's proficiency/skill is called an Elective Course.

1.3 Discipline Specific Elective Course (DSE):

Elective courses may be offered by the main discipline/subject of study is referred to as **Discipline Specific Elective**. The University/Institute may also offer discipline related Elective courses of interdisciplinary nature (to be offered by main discipline/subject of study).

1.4 Generic Elective (GE) Course:

An elective course chosen generally from an unrelated discipline/subject, with an intention to seek exposure is called a **Generic Elective**.
P.S.: A core course offered in a discipline/subject may be treated as an elective by other discipline/subject and *vice versa* and such electives may also be referred to as Generic Elective.

1.5 Ability Enhancement Courses (AEC):

The Ability Enhancement Courses (AEC) / Skill Enhancement Courses (SEC). "AEC" courses are the courses based upon the content that leads to life skill enhancement.

1.6 Ability Enhancement Compulsory Courses(AECC):

University will run a number of **Ability Enhancement Compulsory Courses(AECC)**which is qualifying in nature andstudent from all faculties have to qualify in all such courses.

1.7 Dissertation/Project/ Internship/ Industrial Training/ Field Work:

Elective coursesare designed to acquire advanced knowledge to supplement /support the main subject through project work/ internship/ industrial training/ field work. A student studies such a

course on his/her own withmentoring support by a teacher / faculty member called the guide/ supervisor. In case of internship/ industrial training the student will work under the joint guidance of one teacher-supervisorfrom the parent department to be termed as Supervisor-1 and one suitably qualified personnel at the research institute/ research laboratory/ industrial organization, to be termed Supervisor-2. A student may join any recognized research institute/ research laboratory/ the industrial organization with the approval of parent department. The student has to work for a minimum number of days/ hour as decided by the parent department and submit a written project report certified by both supervisors to the parent department. On completion of the project work/ training at the research institute/ research laboratory/ industrial organization,Supervisor-2 will issue a letter certifying thatthe candidate has successfully completed the project and also award marks/ grade to him/ her. The certificate will be submitted to the parent department confidentially. The Board of Courses of Studies (BOCS) of the concerned subject/ department will draft and design the certificate as per requirement. The parent department will also assist the students to choose proper organizations for their project work/ industrial training/ field work etc.

2.0 CREDIT

The total minimum credits, required for completing a PG program is 100.

The details of credits for individual components and individual courses are given in Table.2.

Table 1: Structure of the 2 Yrs (Four Semesters) Post Graduate Degree course under CBCS:

Semester	No of COURSE / Papers	Credit per COURSE/ paper	Total credit	Minimum No of Learning Hours#	No of CORE COURSE/ PAPER	No of ELECTIVE Course/ PAPER	Code & Nature of Elective Course/ paper
I	05	05	25	250	4	1	AECC-1
SEMESTER BREAK							
II	06	05	30	300	5	1	AEC-1
SEMESTER BREAK							
III	06	05	30	300	5	1	AECC-2
SEMESTER BREAK							
IV	03	05	15	150	0	3	EC -1* EC -2* DSE-1 or GE-1
Total	**20**		**100**	**1000**	**14**	**6**	

#For Tutorial (T)/ Practical (P)/ Field Work (FW)/ Internship etc. extra working hour to be added as per requirement and will be decided by the BOCS of the respective subject.

* The two **Elective Courses (EC)** to be studied in semester IV may be

Both theory papers
/ One Theory paper and One Practical paper
/ One Theory paper and One Project work
/ One Theory paper and One Field work
/ Both Project work/ Internship

IMP : It is desirable that all students of all courses be given adequate exposure over and above the class room teaching to enhance the scope of skill development/ entrepreneurship and employability.

2.1. There shall be six elective courses - two EC, one DSE or one GE, two AECC, one AEC. Students may opt for any elective course out of a list of elective papers **(Basket)** offered by the parent department or any other department/s as per his/her choice with the prior permission of the parent department. The list of elective papers, syllabus and prerequisite of the elective course will be as decided by the Board of Courses of Studies (BOCS) of the concerned subject/ department. All elective course listed may not be available in all semesters. Based on the availability of resource persons and infrastructure the parent department will assist the students to select elective courses of their choice.

2.2. The final CGPA/ class will be decided on the performance of the student in the 16 courses/ papers including the 14 Core Courses (CC) / papers and two EC /papers.

2.3 The one DSE or one GE, two AECC, one AEC papers will be qualifying in nature and a student has to score at least 45% marks in these papers. Grade will be awarded separately for these courses, however, performance in these elective courses/ papers will not be considered for awarding the final CGPA/ class.

2.4 **Ability Enhancement Compulsory Courses(AECC):**

University will run two **Ability Enhancement Compulsory Courses** (AECC) which are qualifying in nature anda student has to qualify in both these courses. The courses are:

AECC-1 : Environmental Sustainability (3 Credit) &Swachchha Bharat Abhiyan Activities (2 Credit)
AECC- 2 : Human Values & Professional Ethics (3 Credit) & Gender Sensitization (2 Credit)

Students will do assignments/project work related to institutional social responsibilities including Swachchha Bharat Abhiyan Activities during SEMESTER BREAK.

2.5 University will run a number of **Ability Enhancement Courses** (AEC) and Skill Enhancement Courses; a student can choose one from these. For example:

Basket Ability Enhancement Courses (AEC)

- Computers and IT Skill
- Web Designing
- Financial Risk Management/
- Solid waste Management/
- Mushroom Culture /
- Bio-fertilizer production/
- Environmental Law/
- Tourism & Hospitality Management/
- Lifeskill& skill development /
- Yoga Studies

etc.

2.6 Discipline Specific Elective (DSE):

In each subject the CC / paper -5 being taught in the second semester will be open to be selected as a DSE paper. In the first phase a student will be allowed to choose a paper from any subject other than his/ her Core Course (CC) from the same faculty in the same university.

2.7 Generic Elective (GE) Course:

University will run a number of **Generic Elective Courses** (GE); a student can choose one from these. For example:

Basket of GE courses

- Music
- Dramatics
- Fine Arts
- Graphic Design
- Inclusive Policies
- Human Rights
- Any course run by any department

M.Sc. PHYSICS
(Four Semester Course)

PROGRAM OBJECTIVES:

1. To develop strong student competencies in Physics and its applications in a technology-rich, interactive environment.
2. To develop strong student skills in the research, analysis and interpretation of complex information
3. To prepare the students to successfully compete for employment in Electronics, Manufacturing and Teaching industry.
4. To develop human resource with a solid foundation in theoretical and experimental aspects of respective specializations as a preparation for career in academia and industry.

Course Structure

Semester I (July to December)					
Code	Subject	Credits	E.S.E.	C.I.A.	Total
MPHYCC-1	Classical Mechanics	5	70	30	100
MPHYCC-2	Mathematical Physics	5	70	30	100
MPHYCC-3	Quantum Mechanics	5	70	30	100
MPHYCC-4	Lab-I	5	70	30	100
MPHYAECC-1	Environmental Sustainability (3 Credits) and Swachchha Bharat Abhiyan Activities (2 Credits)	5	70	30	100
Semester II (January to June)					
Code	Subject	Credits	E.S.E.	C.I.A.	Total
MPHYCC-5	Modeling and Simulation	5	70	30	100
MPHYCC-6	Electrodynamics& Plasma Physics	5	70	30	100
MPHYCC-7	Electronics I	5	70	30	100
MPHYCC-8	Thermodynamics and Statistical Mechanics	5	70	30	100
MPHYCC-9	Lab-II	5	70	30	100

MPHYAEC-1	Any one of the followings: • Computers and IT Skill • Web Designing • Financial Risk Management/ • Solid waste Management/ • Mushroom Culture / • Bio-fertilizer production/ • Environmental Law / • Tourism & Hospitality Management/ • Lifeskill& skill development / • Yoga Studies	5	70	30	100

Semester III (July to December)					
Code	Subject	Credits	E.S.E.	C.I.A.	Total
MPHYCC-10	Atomic and Molecular Physics	5	70	30	100
MPHYCC-11	Condensed Matter Physics	5	70	30	100
MPHYCC-12	Electronics II	5	70	30	100
MPHYCC-13	Nuclear and Particle Physics	5	70	30	100
MPHYCC-14	Lab-III	5	70	30	100
MPHYAECC-2	Human Values and Professional Ethics (3 Credit)and Gender Sensitization (2 Credit)	5	70	30	100
Semester IV (January to June)					
Code	Subject	Credits	E.S.E.	C.I.A.	Total
MPHYEC-1	Elective Paper I	5	70	30	100
MPHYEC-2	Elective Paper II Part 1: Practical – 50 marks Part 2: Dissertation – 50 marks	5	70	30	100
MPHYDSE-1 Or MPHYGE-1	For MPHYDSE-1, in each subject the CC / paper -5 being taught in the second semester will be open to be selected as a DSE paper. In the first phase a student will be allowed to choose a paper from any subject other than his/ her Core Course (CC) from the same faculty in the same university.	5	70	30	100
	For MPHYGE-1, a student can choose any one from the following:				

	• Music • Dramatics • Fine Arts • Graphic Design • Inclusive Policies • Human Rights • Any course run by any department				

Elective-I Code: PHYEC-1

Elective Theory Papers for Semester 4 (One to be selected from the following set of 10 options)

Code	Subject	Credits	E.S.E.	C.I.A.	Total
MPHYEC-1	Advanced Quantum Mechanics	5	70	30	100
	Advanced Condensed Matter Physics				
	Atmospheric Physics				
	Biophysics				
	Lasers and Photonics				
	Measurement and Instrumentation				
	Computational Methods				
	Nano Science				
	Plasma Physics				
	Crystal Physics and X – Ray Crystallography				
	Energy Science				
	Environmental Physics				

Elective-II Code: MPHYEC-2

Part 1: Practical on any one of the topics from the set of following options:

Part 2: Dissertation on any topic on Physics

Code		Subject	Credits	E.S.E.	C.I.A.	Total
	Part I	Advanced Quantum Mechanics	2.5	35	15	50
		Advanced Condensed Matter Physics				
		Atmospheric Physics				
		Biophysics				

MPHYEC-2		Lasers and Photonics				
		Measurement and Instrumentation				
		Computational Methods				
		Nano Science				
		Plasma Physics				
		Crystal Physics and X – Ray Crystallography				
		Energy Science				
		Environmental Physics				
	Part 2	Dissertation [On any Topic on Physics]	2.5	35	15	50

Marks and Workload Distribution

Each paper will be of 100 marks. End Semester Examination (ESE) will carry 70 marks.

Continuous Internal Assessment (CIA) will carry 30 marks

Pass marks in every semester paper is 45%.

Aggregate mark in a semester must be at least 45% for clearing the subject papers of each semester.

Total credit 100
Semester I- 25 credit
Semester II-30 credit
Semester III- 30 credit
Semester IV-15 credit

1 credit is equivalent to 10 theory hours or 20 laboratory hours.

Theory Paper		Credit – 05	Total Marks – 100		
Type of Examination	Duration	Question Papers and Details of Evaluation	No. of Questions to be set	Distribution of Marks	Total
End Semester Examination [Written] (70 Marks)	3 Hours	Group A: Multiple Choice type	10	2 X 10 = 20	20
		Group B: Short Answer type (5 questions, one from each unit)	05	4 X 5 = 20	20
		Group C: Long Answer Type (5 questions one from each unit)	05	6 X 5 = 30	30

Continuous Internal Assessment [CIA] (30 marks)	1 Hour	Mid-semester Test - 02 (written) (each of 7.5 mark)			7.5 X 2 = 15
		Group A: Multiple Choice Type	03	0.5 X 3	
		Group B: Short Answer Type	02	1.5 X 2	
		Group C: Long Answer Type	01	3 X 1	
		Assignment			05
		Seminar/Quiz			05
		Attendance, Punctuality & Conduct			05
Practical Paper		Credit – 05	Total Marks: 100		
End Semester Examination (ESE)	6 Hours	1 Experiment to be performed			70
Continuous Internal Assessment (CIA)					30
Elective Practical and presentation of Dissertation	6 Hours	1 Experiment to be performed plus Dissertation presentation		35+35	70
CIA of Practical and Dissertation				15+15	30

Program Outcomes:

The recent developments in Physics, has been included in the enriched M.Sc.(Physics) Syllabus to meet the present day needs of Academic and Research Institutions and Industries. Animportant objective of the course is to develop an understanding of ‘core physics’ at deeper levels , each stage revealing new phenomena and greater insight into the behavior of matter and radiation. The various courses in the first two semesters, are designed to bridge the gap between college and university level physics and to bring all students to a common point. These courses also aim to consolidate the college level knowledge of physics by providing much more logical and analytical framework which will be essential for the specialization courses in the third and fourth semesters. After the completion of their M.Sc. Students will have:

1. Strong analytical abilities.
2. Qualities needed for teaching of Science and doing research.
3. Knowledge of theoretical as well as experimental areas of Physics.
4. Capabilities to generate self-employment.
5. Computational Skill and ICT development.

****

SEMESTER I

MPHYCC-1: Classical Mechanics (5 Credits)

Course objectives:

1. To give students a solid foundation in classical mechanics.
2. To introduce general methods of studying the dynamics of particle systems.
3. To give experience in using mathematical techniques for solving practical problems
4. To apprise the students of Lagrangian and Hamiltonian formulations and their applications.
5. To apprise the students regarding the concepts of electrodynamics and its use in various situations.

The End Semester Examination will be of 3 hour duration and will carry 70 marks. The Question paper will be divided into three parts A, B and C. Part A will have ten compulsory questions (multiple choice type) covering the whole syllabus with 2 from each unit (10 X 2 = 20). Part B will have five short answer questions, with one question from each unit. The student is required to answer any four out of them (4 X 5 = 20). Part C will have five long answer questions with one question from each unit. The student is required to answer any three out of them (3 X 10 = 30).

UNIT 1Lagrangian Dynamics and Hamiltonian formulation: Constraints, Principal of Virtual Work, D'Alembert'sprinciple and its applications, Lagrange's equation and its applications. Jacobi integral and energy conservation, Concept of symmetry, velocity dependent potential. Variational calculus and Least Action principle, Hamilton's principle, Lagrange's equation from Hamilton's principle, Legendre transformations, Hamilton's function and Hamilton's equation of motion, configuration space and phase space Hamilton's equations from Variational principle.

UNIT 2.Canonical transformations and Hamilton Jacobi theory: Generating function, canonical transformation and its examples, group property, Lagrange and Poisson brackets and other canonical invariants, equation of motions, Infinitesimal canonical theorem in Poisson bracket formalism, Jacobi identity, Angular momentum- Poisson bracket relations. The Hamilton-Jacobi equation for Hamilton's principal and characteristic functions with example; the harmonic oscillator, Separation of variable in Hamilton-Jacobi equation; Action-angle variables and its examples – the Kepler problem in action-angle variables.

UNIT 3 Central Force Motion and Rigid Body: Reduction to one-body problem, General Properties of central force, Effective potential, Motion in a central force field – general solution, Inverse Square Law force. Kepler's Laws – laws of gravitation form Kepler's laws, Virial theorem. Scattering in a central force field and in Laboratory Co-ordinates. The rigid bodies, Kinematics of rigid body motion, Orthogonal transformations, Euler's theorem and its applications. Finite and infinitesimal rotations,rate of change of a vector, the rigid body equation of motion, Coriolis effect, angular momentum and kinetic energy of motion about a point, the inertia tensor and the moment of inertia, theprincipal axis transformation, the Euler equations of motion.

UNIT 4 Small Oscillation: Formulation of the problem, the eigenvalue equation and the principal axis transformation, frequencies of free vibrations and normal coordinates, forced vibrations and the effect

of dissipative forces. Resonance and beats.

UNIT 5. Relativity: Review of special theory of relativity - Lorentz transformations; 4-vectors, 4-dimensional velocity and acceleration; 4-momentum and 4-force; Covariant equations of motion; Relativistic kinematics (decay and elastic scattering); Lagrangian and Hamiltonian of a relativistic particle. General theory of relativity: Curved space-time; Eotvos experiment and the equivalence principle.

Course Outcomes:

1. Know the difference between Newtonian mechanics and Analytic mechanics
2. Solve the mechanics problems using Lagrangian formalism, a different method from Newtonian mechanics
3. Understand the connection between classical mechanics and quantum mechanics from Hamiltonian formalism
4. Understanding of basic concepts of special and general theory of relativity

References:

1. N C Rana & P S Joag, Classical Mechanics, McGraw Hill, First Edition 2011
2. Herbert Goldstein, Charles P. Poole, and John L. Safko, Classical Mechanics, Pearson, Third Edition 2011.
3. John R. Taylor, Classical Mechanics, University Science Books, First Edition 2005.
4. David Morin, Introduction to Classical Mechanics, Cambridge University Press, First Edition 2008.

MPHYCC-2 Mathematical Physics (5 Credits)

Course Objectives:

1. To develop knowledge in mathematical physics and its applications.
2. To develop expertise in mathematical techniques that are required in physics.
3. To enhance problem solving skills
4. To give the ability to formulate, interpret and draw inferences from mathematical solutions.

The End Semester Examination will be of 3 hour duration and will carry 70 marks. The Question paper will be divided into three parts A, B and C. Part A will have ten compulsory questions (multiple choice type) covering the whole syllabus with 2 from each unit (10 X 2 = 20). Part B will have five short answer questions, with one question from each unit. The student is required to answer any four out of them (4 X 5 = 20). Part C will have five long answer questions with one question from each unit. The student is required to answer any three out of them (3 X 10 = 30).

Unit 1: Linear Differential equations and special functions:

Linear Differential Equations, Power series solutions; Special Functions: Hermite, Legendre, Bessel, Lauguerre Polynomials;.

Unit 2: Elements of Complex analysis:

Analytic functions, Taylor and Laurent series, calculus of residues, nature of singularities, Evaluation of definite integrals, Jordan's lemma

Unit 3: Green's Function & Transform

Green's Function, Dirac Delta Function, Properties and applications, Fourier, Laplace Transforms; properties and applications

Unit 4: Group Theory:

Groups, subgroups, cosets, invariant subgroups, factor groups, symmetry, symmetry elements and symmetry operations, homomorphism and isomorphism, orthogonality theorems, Continuous groups with special reference to O(3), SU(2),SU(3).

Unit 5: Elementary Tensor Analysis

Coordinate transformations, Contravariant and covariant vectors, Contravariant, covariant and mixed tensors, tensor fields, symmetric and skew symmetric tensors, fundamental operations with tensors, metric tensor, conjugate tensors, and associated tensors

Course Outcome:

1. Master the basic elements of complex mathematical analysis
2. Solve differential equations that are common in physical sciences
3. Apply group theory and integral transforms to solve mathematical problems of interest in Physics

4. Understanding how to use special functions in various physics problems

References:

1. Arfken & Weber, Mathematical Methods for Physicists, Elsevier, Sixth Edition 2012.

2. Murray R. Spiegel, Schaum's Outline of Advanced Mathematics for Engineers and Scientists, McGraw Hill, First Edition 2009.

3. Mary L. Boas, Mathematical Methods in the Physical Sciences, John Wiley, Third Edition 2005.

4. Murray R. Spiegel, Seymour Lipschutz, John J. Schiller, and Dennis Spellman, Schaum's Outline of Complex Variables, McGraw Hill, Second Edition 2009.

MPHYCC– 3 Quantum Mechanics (5 Credits)

Course Objectives:

1. To illustrate the inadequacy of classical theories and the need for a quantum theory
2. To explain the basic principles of quantum mechanics
3. To develop solid and systematic problem solving skills.
4. To apply quantum mechanics to simple systems occurring in atomic and solid state physics

The End Semester Examination will be of 3 hour duration and will carry 70 marks. The Question paper will be divided into three parts A, B and C. Part A will have ten compulsory questions (multiple choice type) covering the whole syllabus with 2 from each unit (10 X 2 = 20). Part B will have five short answer questions, with one question from each unit. The student is required to answer any four out of them (4 X 5 = 20). Part C will have five long answer questions with one question from each unit. The student is required to answer any three out of them (3 X 10 = 30).

Unit 1: Mathematical Foundations: Linear vector spaces, dimensionality, basis, eigenvalue equations, **orthonormality** and completeness conditions; Observables, Dirac's Bra and Ket notation, Properties of Hermitian operators, unitary and similarity transformation; Operators, Fourier Transform, Wave function as a vector in Hilbert space, Superposition principle; **Position and Momentum Representations**, Relation between state vector and wave function; Transformation between **position** and momentum representations, Ehrenfest Theorem.

Unit 2: Quantum Dynamics: Schrodinger, Heisenberg and Interaction pictures; **Particle in a Box**; Linear Harmonic Oscillator solution using Schrodinger picture and Heisenberg picture, Angular Momentum, spin and parity operators: symmetry and conservation principle, definition of angular momentum, ladder operators, allowed values, construction of angular momentum matrices; Spin and Pauli spin matrices; Coupling of angular momentum, C.G. Coefficients.

Unit 3: Perturbation theory: Time-independent perturbation theory - Non-degenerate and degenerate states; Spin-orbit Coupling; Fine structure of Hydrogen; Variational method; WKB approximation, Time-dependent perturbation theory- constant and periodic perturbation, Fermi Golden Rule, Sudden and adiabatic approximations.

Unit 4: Scattering: Quantum Scattering Theory: Differential and total cross sections; Scattering Amplitudes; Formal expression for scattering amplitude - Green's function method, Born approximation – its application to spherically symmetric potentials; **Partial wave analysis; Optical Theorem.**

Unit 5: Relativistic Quantum Mechanics:

The Klein-Gordon (KG) equation, Interpretation of the KG equation, Dirac's equation, Free particle solution, equation of continuity, Plane wave solutions of the Dirac's equation, Non-relativistic limit of the Dirac's equation.

Course Outcome:

1. To have a working knowledge of the foundations, techniques and key results of quantum mechanics.
2. To comprehend basic quantum mechanical applications at the research level.

3. Gain an ability to competently explain/teach quantum physics to others.

References:

1. David J. Griffiths, Introduction to Quantum Mechanics, Pearson, Second Edition, 2009.
2. N. Zettili, Quantum Mechanics Concepts and Application, Wiley, Second Edition, 2009.
3. J. J. Sakurai, Modern Quantum Mechanics, Pearson, Revised Edition, 2002.
4. P. M. Mathews and K. Venkatesan, Quantum Mechanics, McGraw Hill, Second Edition, 2010.

MPHYCC–4 Lab-I (5 Credits)

Course Objectives:

1. To make the student familiarize with the basics of experimental physics.
2. To enable the student to explore the concepts involved in the thermodynamics and heat
3. To make the student understand the basic concepts in modern optics
4. To allow the student to understand the fundamentals of instruments involved

List of experiments (minimum12):

1. Measurement of Hall Coefficient of given semiconductor: identification of type of semiconductor and estimation of charge carrier concentration
2. Young's modulus – Elliptical fringe method
3. Young's modulus – Hyperbolic fringe method
4. Four Probe Method – Determination of resistivity of semiconductor at different temperatures
5. Determination of Ultrasonic velocity in given liquid for a fixed frequency
6. Determination of optical absorption coefficient and determination of refractive index of the liquidsusing He-Ne / Diode Laser
7. Measurement of laser parameters using He – Ne laser / diode laser
8. Verification the Malus law using polarizing sheet
9. Estimation the absorption coefficient of the air media and polarizing sheet
10. Variation of optic axis with increasing the sucrose solution using polarizing sheet
11. Determination of wavelength of a laser by Michelson Interferometer method
12. Thermistor /LED – Determination of energy gap
13. Determination of numerical aperture of an optical fiber
14. Determination of wavelength of a laser source using diffraction grating.
15. Determination of operating voltage of a GM tube and determine the linear absorption coefficient and verify inverse square lane.
16. Determination of operating voltage of a GM tube and verify inverse – square law
17. Direct reading of Zeeman effect (e/m of an electron) with a laser source
18. Compact microwave training system Experiment
19. Stefan's constant.
20. Susceptibility – Guoy and Quincke's methods.
21. Hydrogen spectrum and solar spectrum – Rydberg's constant.

Course Outcome:

At the end of the course,

1. The student should have knowledge of the different experimental techniques.
2. The student should have understood the basics of physics involved in experiments
3. The student should be able to apply the concepts of physics and do the interpretation and acquire the result.

SEMESTER II

MPHYCC-5 Modeling and simulation(5 Credits)

(Inter disciplinary in nature)

Course Objectives:

1. To encourage students to "discover" physics in a way how physicists learn by doing research.
2. To address analytically intractable problems in physics using computational tools.
3. To enhance the various computational technique with programming basic in C++/Python/ Java to face the world of problems using high performance iteration techniques.
4. To show how physics can be applied in a much broader context than discussed in traditional curriculum.

The End Semester Examination will be of 3 hour duration and will carry 70 marks. The Question paper will be divided into three parts A, B and C. Part A will have ten compulsory questions (multiple choice type) covering the whole syllabus (10 X 2 = 20). Part B will have five short answer questions, with one question from each unit. The student is required to answer any four out of them (4 X 5 = 20). Part C will have five long answer questions with one question from each unit. The student is required to answer any three out of them (3 X 10 = 30).

Unit 1: Object oriented Programming language

Object oriented paradigm with reference to C++: Objects and classes, Encapsulation and data abstraction, Delegation; Inheritance, Polymorphism: function and operator overloading, dynamic binding; message communication; Elementary idea about Fortran,

Unit 2: Programming with Python:

Program development, Variables, Expressions and statements, Functions, Conditionals and Recursion, Iteration, Strings, Lists, Dictionaries, Tuples, Files, Types of errors and Debugging, Function Libraries, Numpy, Scipy, Matplotlib, Use of Scilab and R for scientific programming.

Unit 3: ODE and PDE:

ODE: RK method, Leap Frog method; Application to electron motion in electric and magnetic fields; Non-linear equations; PDE: Elliptic equations: Poisson equation; Hyperbolic equations: wave equation; Parabolic equation: Diffusion equation for Lagrangian fluids.

Unit 4: Matrix Problems

Matrix inversion: determinant method, Gauss- Jordan elimination method; Linear equation solving: Gauss–Seidel method, Gauss - Jacobi's Iteration method, Techniques for solving eigenvalue problems: determinant method using characteristic equation, power method, Jacobi's method

Unit 5: Monte Carlo method and simulation

Random number generators, Monte Carlo integration, Random walk problem, Metropolis algorithm,Ising model, Molecular dynamic.

Course Outcome:

At the end of this course, students will be able to

1. Learn how to interpret and analyze data visually, both during and after computation.
2. Gain an ability to apply physical principles to real-world problems.
3. Acquire a working knowledge of basic research methodologies, data analysis and interpretation.
4. Understand various simulation techniques which can be used in future by students to analyse the data.

References:

1. Rubin H. Landau, Manuel J. Paez, Computational physics-Problem solving with computers, John Wiley & sons, New York (1997).
2. P.L. DeVries, A First Course in Computational Physics, , John Wiley & sons, New York (1994).
3. G. Golub and J.M. Ortega Scientific Computing: An Introduction with Parallel Computing, Academic Press, San Diego (1993)..
4. J. M. Thijssen, Computational Physics, , Cambridge University Press, Cambridge, 1999

MPHYCC-6Electrodynamics and Plasma Physics (5 Credits)

Course Objectives:

1. To apprise the students regarding the concepts of electrodynamics and its use in various situations.

The End Semester Examination will be of 3 hour duration and will carry 70 marks. The Question paper will be divided into three parts A, B and C. Part A will have ten compulsory questions (multiple choice type) covering the whole syllabus with 2 from each unit (10 X 2 = 20). Part B will have five short answer questions, with one question from each unit. The student is required to answer any four out of them (4 X 5 = 20). Part C will have five long answer questions with one question from each unit. The student is required to answer any three out of them (3 X 10 = 30).

UNIT 1. Electromagnetic wave equation and field vectors: Maxwell's equations in free space, Plane wave in free space. Dispersion of electromagnetic waves, Poynting vector in free space. Polarization of electromagnetic waves, electric field vector in terms of scalar and vector potential, Wave equation in terms of scalar and vector potential.

UNIT 2. Electromagnetic waves and its Interaction with matter on macroscopic scale: Electromagnetic waves(EMW) in free space, propagation of EMW-in isotropic, anisotropic dielectrics, in conducting media; Boundary conditions, reflection and refraction of EMW, Fresnel formulae, Brewster's law and degree of polarization, total internal reflection and critical angle, reflection from a metallic surface, Propagation of EMW between conducting planes, Wave guides: TE and TM mode, Transmission lines, Rectangular and cylindrical wave guides, cavity resonator

UNIT 3. Fields of moving charges and Radiating System: Retarded Potentials, LienardWiechert potentials, field of a point charge in uniform rectilinear motion, in arbitrary motion, Radiation from an accelerated charged particle at low and high velocity. Radiating System: Oscillating electric dipole, radiation from an oscillating dipole, from a small current element, from a linear antenna, Antenna arrays

UNIT 4. Relativistic Electrodynamics: Transformation equation for current density and charge density, vector potential and scalar potentials, the electromagnetic field tensor, transformation equation for electric and magnetic field, Covariance of Maxwell equation in four tensor form, covariance of Maxwell and transformation law of Lorentz force.

UNIT 5. Plasma Physics: Elementary concepts of plasma, derivation of moment equations from Boltzman equation. Plasma oscillation, Debye shielding, plasma confinement, magneto plasma. Fundamental equations, hydromagnetic waves: magnetosonic waves, Alfven waves, wave propagation parallel and perpendicular to magnetic field.

Course Outcomes:

Students will have understanding of:

1. Time-varying fields and Maxwell equations.

2. Various concepts of electromagnetic waves.

3. Radiation from localized time varying sources, and the charged particle dynamics.

References:

1. Introduction to Electrodynamics, David J.Griffths, Prentice-Hall of India, Third Edition, 2009
2. Classical Electrodynamics, J.D.Jackson, Wiley Publishing, Newyork, 3rd Edition, Eight Print, 2002.
3. J.A. Bittencourt, Fundamentals of Plasma Physics, Third edition, (Springer Publication, 2004.

MPHYCC-7 Electronics I (5 Credits)

Course Objectives:

1. To make the student familiarize with the basics of electronics.
2. To enable the student to explore the concepts involved in the oscillators
3. To make the student understand the basic concepts in IC and digital devices
4. To allow the student to understand the fundamentals of multivibrators
5. To provide in-depth theoretical base of Digital Electronics

The End Semester Examination will be of 3 hour duration and will carry 70 marks. The Question paper will be divided into three parts A, B and C. Part A will have ten compulsory questions (multiple choice type) covering the whole syllabus with 2 from each unit (10 X 2 = 20). Part B will have five short answer questions, with one question from each unit. The student is required to answer any four out of them (4 X 5 = 20). Part C will have five long answer questions with one question from each unit. The student is required to answer any three out of them (3 X 10 = 30).

Unit 1: Semiconductor devices:

BJT, JFET, MOSFET (Enhancement and depletion types), UJT, SCR, TUNNEL Diode, Zener Diode: Structure, working and characteristics.

Unit 2: Amplifiers and feedback:

BJT biasing, design of a CE transistor amplifier, small signal model, emitter follower, Negative feedback and its properties (effect of feedback on different parameters), types of feedback; Oscillators: Principles, Barkhausen criterion, frequency stability, phase shift oscillator, Wien bridge oscillator.

Unit 3: Operational Amplifiers

Operational amplifier block diagram, ideal and practical op-amp characteristics; Op amp circuits: inverting and non-inverting amplifier, adder, subtractor, differentiator, integrator, current to voltage converter, first order active filters.

Unit 4: Digital Electronics

Number systems and codes, binary arithmetic, logic gates: AND, OR, NAND, NOR, NOT, XOR. Boolean algebra theorems, De-morgan`s theorems, Minterm and Maxterm representation, simplification using Boolean algebra theorems and K- maps, half and full adders, flip-flops - RS and JK. Elementary ideas of Registers, counters, comparators

Unit 5: Microprocessor and microcontroller

Microcomputer Block Diagram, System Buses, 8085 Microprocessors, architecture and operation, Assembly language Instructions (classification only). 8051 Microcontroller Architecture, Ports and

elementary idea of interfacing.

Course Outcomes:

Students will have understanding of:

1. Fundamental designing concepts of different types of Logic Gates, Minimization techniques etc.
2. Designing of different types of the Digital circuits, and to give the computational details for Digital Circuits.
3. Characteristics of devices like PNP, and NPN junction diode and truth tables of different logic gates.
4. Basic elements and to measure their values with multimeter and their characteristic study.
5. How to construct electronic circuit

References:

1. J. Millman,and H. Taub, Pulse Digital and Switching Wave forms, Tata McGraw Hill, (1991).
2. R. L. Boylestad, and L. Nashelsky, Electronic Devices and Circuit Theory, Prentice Hall of India, (2007).
3. D. A. Bell, Electronics Devices and Circuits, Oxford University, (2008).
4. Ben.G.Streetman, Solid state electronic devices, Printice Hall, Englewood cliffs, NJ (1999).
5. R.A.Gayakwad, Op-Amps & Linear integrated circuits, Printice Hall India Pvt. Ltd.(1999).

MPHYCC-8 Statistical Mechanics (5 Credits)

Course Objectives:

1. The course is to understand the basics of Thermodynamics and Statistical systems.
2. Understand the various laws of thermodynamics
3. Acquire the knowledge of various statistical distributions.
4. To comprehend the concepts of Enthalpy, phase transitions and thermodynamic functions.

The End Semester Examination will be of 3 hour duration and will carry 70 marks. The Question paper will be divided into three parts A, B and C. Part A will have ten compulsory questions (multiple choice type) covering the whole syllabus (10 X 2 = 20). Part B will have five short answer questions, with one question from each unit. The student is required to answer any four out of them (4 X 5 = 20). Part C will have five long answer questions with one question from each unit. The student is required to answer any three out of them (3 X 10 = 30).

Unit 1: The statistical basis of thermodynamics:

Postulates of classical statistical mechanics, macroscopic and microscopic states, Phase space, Ensemble- microcanonical, canonical and grand canonical, Statistical equilibrium, densitydistribution of phase point, Liouville's theorem.

Unit 2: Ideal classical gas: Partition function of a classical ideal gas, thermodynamicalpotentials in terms of partition function for an ideal monoatomic gas in microcanonical and grand canonical ensembles, entropy of mixing and Gibbs paradox, Maxwell-Boltzmann distribution law, entropy of monoatomic gas.

Unit 3: Quantum statistics and Applications I:
Density matrix, quantum ensembles, ideal Bose gas, Bose condensation, liquid He II, superfluidity and Landau's theory.

Unit 4: Quantum statistics and Applications II:
Ideal Fermi gas, specific heat and Pauli paramagnetism, Principle of detailed balance, Landau diamagnetism, white dwarfs and Chandrasekhar limit.Ising model, Random walk and Brownian motion;

Unit 5: Noneqlibrium processes:
Features of Equilibrium and Non Equilibrium Thermodynamics, Linear theory of Non Equilibrium Thermodynamics, Current and Affinity, Onsager relation, Fluctuations, Microsystems

Course Outcome:

At the end of this course, students will be able to

1. Basic knowledge of thermodynamic systems
2. Understand the basic idea about statistical distributions
3. Impart the knowledge about the phase transitions and potentials
4. Understand the applications of statistical laws

References:

1. Introduction to Thermodynamics, Classical and Statistical, 3rd EditionRichard E. Sonntag (Univ. of Michigan), Gordon J. Van Wylen (Hope College) ISBN: 978-0-471-61427-2, 1997
2. Pathria R.K., Statistical Mechanics, 2nd Edition, Elsevier, 1996.
3. Thermodynamics and Statistical mechanics , author by John m. seddon and Julian d. gale, 3rd edition, RSC publication, 2001, UK

MPHYCC–9Lab-II (5 Credits)

Course Objectives:

1. To encourage students to "discover" physics in a way how physicists learn by doing research.
2. To address analytically intractable problems in physics using computational tools.
3. To enhance the various computational technique with programming basic in C to face the world of problems using high performance iteration techniques.
4. To show how physics can be applied in a much broader context than discussed in traditional curriculum.

PROGRAMMING NUMERICAL METHODS USING C LANGUAGE (any 8):

1. To find mean, standard deviation and frequency distribution of an actual data set from any physics experiment.
2. Successive approximation (Method of Iteration), Newton Raphson method
3. The Bisection method
4. Gauss Elimination method
5. Matrix Inversion, Lagrange's Interpolation formula
6. Trapezoidal Rule, Simpson's 1/3-rule
7. Euler's method, Runge-Kutta method
8. Predictor corrector methods
9. Numerical integration using Monte Carlo method.
10. To find the area of a unit circle by Monte Carlo integration.
11. To simulate the random walk.
12. Graph plotting of functions such as exponential and trigonometric functions

Course Outcome:

At the end of this course, students will be able to

1. Understand the basic idea about finding solutions using computational methods basics.
2. Learn how to interpret and analyze data visually, both during and after computation.
3. Gain an ability to apply physical principles to real-world problems.
4. Acquire a working knowledge of basic research methodologies, data analysis and interpretation.
5. Realize the impact of physics in the global/societal context.

SEMESTER III

MPHYCC-10 Atomic and Molecular Physics, Lasers (5 Credits)

Course Objectives:

1. Objective of this course is to learn atomic, molecular and spin resonance spectroscopy.
2. To understand mechanism and working of lasers.
3. To be able to understand atomic and molecular transitions and selection rules.
4. To understand the Raman effect and its applications

The End Semester Examination will be of 3 hour duration and will carry 70 marks. The Question paper will be divided into three parts A, B and C. Part A will have ten compulsory questions (multiple choice type) covering the whole syllabus with 2 from each unit (10 X 2 = 20). Part B will have five short answer questions, with one question from each unit. The student is required to answer any four out of them (4 X 5 = 20). Part C will have five long answer questions with one question from each unit. The student is required to answer any three out of them (3 X 10 = 30).

Unit 1: Atomic Physics:

Vector Atom Model (LS, JJ Coupling), Physics of Fine Structure on the basis of SpinOrbit interaction, Anomalous Zeeman Effect Vs Paschen Back Effect, X-Ray Spectroscopy, N.M.R. & E.S.R. spectroscopy, Helium atom as an approximation for many electron atomic systems, Spectra of one Electron Vs two Electrons system, Intensity, Shape and width of Spectral lines, Coherency: Spatial & Temporal, Slater determinants to write possible multiplets.

Unit 2: Electronic and Molecular Spectra: Anharmonic Oscillator (vibration-rotation system), Frank Condon Principle, Principle , Vibration of Polyatomic molecule, Electronic spectra of polyatomic molecules, Chemical analysis by electronic spectroscopy, Spectra of Hydrogen Molecule, Molecular Energy Term Representation.

Unit 3: Molecular Potential: Concept of Molecular Potential, Separation of electronic and nuclear wave function, Born-Oppenheimer approximation and its breakdown, Molecular orbital theory,LCAO approximation theories.

Unit 4: Raman and Spin Resonance Spectroscopy: Experimental study of Raman Spectra, Vibrational and pure rotational Raman spectra, Structure determination, Raman and Infrared spectroscopic Technique and Instrumentation.

Unit 5: LaserPrerequisite: Characteristics of Laser beams, Laser rate equations for three and four Energy level Laser systems Principles of Fiber Communication, Numerical Aperture for Axial and Maridonal rays, Laser communication

Laser Operation: Oscillator vs Amplifier, Laser Resonators, Liquid (Dye) Lasers, Gas (CO_2, Nitrogen and Eximer) lasers, Laser applications in- Industry, Nuclear Science, Spectroscopy, Light detection and Ranging (LIDAR), Scanning laser beam devices, Laser communication(Injection Laser Diode and Avalanche Photodiode) Optical Computing and Medical field.

Course Outcomes:

Students will have understanding of:

1. Atomic spectroscopy of one and two valance electron atoms.
2. The change in behavior of atoms in external applied electric and magnetic field.
3. Rotational, vibrational, electronic and Raman spectra of molecules.
4. Electron spin and nuclear magnetic resonance spectroscopy.
5. Principle, working and applications of laser

References:

1. H. E. White, Introduction to Atomic Spectra, McGraw Hill, (1934).
2. C. N. Banwell, andE. M. McCash, Fundamentals of molecular spectroscopy, Tata McGraw Hill, (2007).
3. Molecular structure and Spectroscopy, G.Aruldhas, Prentice Hall of India, New Delhi, 2001

MPHYCC-11 Condensed Matter Physics (5 Credits)

Course Objectives:

1. To study some of the basic properties of the condensed phase of materials especially solids.
2. To study electrical and magnetic properties of solids
3. To understand superconductivity and various properties of semiconductors

The End Semester Examination will be of 3 hour duration and will carry 70 marks. The Question paper will be divided into three parts A, B and C. Part A will have ten compulsory questions (multiple choice type) covering the whole syllabus with 2 from each unit (10 X 2 = 20). Part B will have five short answer questions, with one question from each unit. The student is required to answer any four out of them (4 X 5 = 20). Part C will have five long answer questions with one question from each unit. The student is required to answer any three out of them (3 X 10 = 30).

Unit 1: Crystal structure:

Crystal: basis, lattice, lattice directions and planes, symmetry, 2D & 3D crystal systems, Reciprocal lattice and applications, Brillouin Zones, Laue equations and Bragg`s law. Laue and powder diffraction; Structure factor, atomic form factor, Intensity of diffraction maxima, extinctions due to Lattice centering.

Unit 2: Electronic Properties:

Motion of electron in periodic lattice, Bloch theorem, nearly free electron model, tight binding and cellular methods, effective mass, intrinsic and extrinsic semi-conductors, Fermi Surface, Cyclotron resonance and de Haas--van Alphen effect

Unit 3: Magnetic Properties:

Heisenberg model, molecular field theory, Spin waves and magnons, Curie-Weiss law for susceptibility, Theories of ferromagnetism, anti-ferromagnetism and ferrimagnetism.

Unit 4: Superconductivity:

Meissner effect, London equation, Fluxquantisation, DC & AC Josephson effect, Crystal Defects: Point defects, line defects, planar faults, role of dislocations in Plastic deformation and crystal growth, colourcentres

Unit 5: Dielectric Properties:

Microscopic concept of Dielectric polarisation, Langevin theory of polarisation, Claussius-Mossotti equation, Dielectrics in Alternating Field, Complex Dielectric constant and Dielectric loss, ferroelectricity, optical properties of crystals.

Course Outcomes:

Students will have understanding of:

1. Structures in solids and their determination using XRD.
2. Behavior of electrons in solids including the concept of energy bands and effect of the same on material properties.
3. Electrical, thermal, magnetic and dielectric properties of solids.

References:

1. Introduction to Solid State Physics, 3rd& 6th Editions. C. Kittel ,Wiley Publishing
2. Condensed Matter in a Nutshell, WilG.D. Mahan, Princetyon Univ. Press 2011.
3. Solid State Physics, W. Ashcroft, N.D. Mermin Holt-Rinehart-Winston 1976.
4. Elementary Solid State Physics, Principles and Applications, Ali Omar.M Addison Wesley Publishing , 2011

MPHYCC-12 Electronics II (Analog and Digital Electronics) (5 Credits)

Course Objectives:

1. To understand the working of advanced semiconductor devices and digital circuits and the utility of OP-AMP
2. To learn the basics of integrated circuit fabrication, applications of timer IC-555 and building block of digital systems.

The End Semester Examination will be of 3 hour duration and will carry 70 marks (Pass Marks-28). The Question paper will be divided into three parts A, B and C. Part A will have ten compulsory questions (multiple choice type) covering the whole syllabus (10 X 2 = 20). Part B will have five short answer questions, with at least one question from each unit. The student is required to answer any four out of them (4 X 5 = 20). Part C will have five long answer questions with at least one question from each unit. The student is required to answer any three out of them (3 X 10 = 30).

Unit-1: Operational Amplifiers construction and other linear devices: Building blocks of an OP-AMP : Differential amplifier – dual input, balanced and unbalanced output amplifiers, current sources, current mirror, level translator, complementary symmetry output. 555 IC timer and its applications, Schmitt trigger. VCO and phase locked loops and their important applications.

Unit 2: OP-AMP applications: Instrumentation amplifier, logarithmic and exponential amplifiers, analog multiplication, comparators, astable and monostablemultivibrators, half wave and full wave precision rectifiers, Active Filters – Second order Butterworth filters – LPF, HPF, narrow band and wide band, band-pass and band-reject filters.

Unit 3: Digital Circuits and Combinatorial logic I: Logic Families – TTL and CMOS, construction of basic gates, characteristics. Combinatorial Circuits – 2's complement adder and subtractor.

Unit 4: Combinatorial logic II: Decoder, encoder, multiplexer, demultiplexer, D/A and A/D convertors.

Unit 5: Sequential Circuits: Master-slave JK flip-flop, D and T flip-flops, edge triggered flip-flops; Registers and Counters – Shift registers, Bidirectional registers, ripple counter, synchronous counter, up-down counter, decade counter, Johnson and Ring counter.

Course Outcomes:

Students will have understanding of:

1. Fundamental designing concepts of different types of Logic Gates, Minimization techniques etc.
2. Designing of different types of the Digital circuits, and to give the computational details for Digital Circuits.
3. Characteristics of devices like PNP, and NPN junction diode and truth tables of different logic gates.
4. Basic elements and to measure their values with multimeter and their characteristic study.
5. Working of Flip-flops, registers and counters.

References:

1. T.F.Schubert and E.M.Kim, "Active and Nonlinear Electronics", John Wiley Sons, New York (1996).
2. L.Floyd, Electronic Devices, "Pearson Education" New York (2004)
3. Dennis Le Crissitte, Transitors, Prentice Hall India Pvt. Ltd (1963)
4. J.Milman and C.C. Halkias, Integrated Electronics, McGraw Hill (1972)
5. A. Mottershed, Semiconductor Devices and Applications, New Age Int Pub
6. M. Goodge, Semiconductor Device Technology Mc Millan (1983)
7. S.M.Sze, Physices of Semiconductor Devices , Wiley-Eastern Ltd.,
8. Milman and Taub, Pulse, digital and switching Waveforms, McGrew Hiil (1965)
9. Ben.G.Streetman, Solid state electronic devices, Printice Hall, Englewood cliffs, NJ (1999)
10. R.A.Gayakwad, Op-Amps & Linear integrated circuits, Printice Hall India Pvt. Ltd.(1999)

MPHYCC-13 Nuclear and Particle Physics (5 Credits)

Course Objectives:

1. To study the general properties of nucleus
2. To study the nuclear forces and nuclear reactions.
3. To introduce the concept of elementary particles
4. To impart knowledge about basic nuclear physics properties and nuclear models for understanding of related reaction dynamics.

The End Semester Examination will be of 3 hour duration and will carry 70 marks. The Question paper will be divided into three parts A, B and C. Part A will have ten compulsory questions (multiple choice type) covering the whole syllabus (10 X 2 = 20). Part B will have five short answer questions, with one question from each unit. The student is required to answer any four out of them (4 X 5 = 20). Part C will have five long answer questions with one question from each unit. The student is required to answer any three out of them (3 X 10 = 30).

Unit 1: Nuclear forces: Exchange forces and tensor forces. Low energy nucleon- nucleon scattering, Effective range theory; Deuteron problem, high energy nucleon-nucleon scattering (Qualitative Discussion), Charge independence, spin dependence and charge symmetry of nuclear forces, Isospin formalism; Yukawa interactions

Unit 2: Nuclear reactions: Kinematics and conservation laws, Nuclear Reactions and Cross sections, Theory of Compound nucleus, Breit-Wigner single level formula, Mechanism of nuclear fission and fusion, Nuclear reactors

Unit 3: Nuclear models: (a) Single particle Shell model: Magic numbers, spin, parity, magnetic dipole moment, electric dipole moment, (b) The Nilsson unified model, (c) Collective model: vibrational and rotational states, β and γ bands

Unit 4: Nuclear decay: (a) Fermi theory of β decay, allowed and forbidden transitions, Parity violation in β decay and Helicity of neutrino. (b) Radiative transitions in nuclei (γ-decay), Spontaneous decay, internal conversion, Mossbauer Effect

Unit 5: Elementary Particle Physics: Conservation Laws and Symmetry, Strangeness, hypercharge, CPT invariance, Classification of elementary particles, SU(2) symmetry and its application to decay and scattering processes, SU(3) symmetry and the Quark model, Elementary idea of chromodynamics.

Course Outcomes:

At the end of the course, the students can able to

1. Acquire basic knowledge about nuclear and particle physics
2. Develop the nuclear reactions and neutron physics.
3. Understand the nuclear fission and fusion reactions.
4. Impart the knowledge about the nuclear forces and elementary particles

References:

1. Kenneth S. Krane, Introductory nuclear physics, Wiley India, New Delhi (2008).
2. J. Basdevant, J. Rich, M. Spiro, Fundamentals in nuclear physics, Springer, New York (2005).
3. D. Griffiths, Introduction to elementary particles, Wiley VCH, Weinheim (2008).
4. D.C. Tayal, Nuclear Physics, 4thedition, Himalaya House, Bombay (1980).

MPHYCC-14 Lab-III(5 Credits)

Course Objectives:

1. To make the student familiarize with the basics of electronics.
2. To enable the student to explore the concepts involved in the oscillators
3. To make the student understand the basic concepts in IC and digital devices
4. To allow the student to understand the fundamentals of multivibrators

LIST OF EXPERIMENTS (minimum 12)

1. Study of Transistor Bias Stability
2. Construction a single stage RC coupled amplifier using transistor and study its frequencyresponse.
3. Construction of a two stage RC coupled amplifier using transistor and study its frequency response.
4. Study of Silicon Controlled Rectifier
5. Study the characteristics of UJT
6. Experiment on FET and MOSFET characterization and application as an amplifier
7. Construction of an Astablemultivibrator circuit using OP AMP & 555 IC's
8. Characteristics of Tunnel diode and Gunn diode
9. Construction of a bistablemultivibrator circuit using IC555 and study its performance.
10. Construction of adder, subtracter, differentiator and integrator circuits using the given OP – Amp
11. Construction of an A/D converter circuit and study its performance

12. Construction of an D/A converter circuit and study its performance
13. Construction of half – adder and full – adder circuit using NAND gates and study their performance.
14. Construction of half – subtracter and full – subtracter circuit using NAND gates.
15. Design of sehimitt's Trigger using ICs 741 and 555 timer – study of frequency divides.
16. Flip flops – RS, JK and D flip flops
17. Shift register and Photo diode characteristics
18. Study of counters: Ripple, Mode 3, Mod 5 counters
19. Photo – diode characteristics
20. Photo – transistor characteristics
21. Analog computer circuit design – solving the simultaneous equations.
22. Multiplexer and Demultiplexer
23. Decoders and Encoders

Course Outcome:

At the end of the course,

1. The student will have a knowledge on the different experimental techniques involved in electronics.
2. The student should be able to independently construct the circiuts
3. The student should be able to apply the concepts of electronics and do the interpretation andacquire the result.

SEMESTER IV

MPHYEC-1 Elective Paper 1 (5 Credits)

A	Advanced Quantum Mechanics
B	Advanced Condensed Matter Physics
C	Atmospheric Physics
D	Biophysics
E	Lasers and Photonics
F	Measurement and Instrumentation
G	Computational

One to be chosen from the following options:

H	Nano Science
I	Plasma Physics
J	Crystal Physics and X – Ray Crystallography
K	Energy Science
L	Environmental Physics

MPHYEC-1A Advanced Quantum Mechanics(5 Credits)

Course Objectives:

1. To impart knowledge of advanced quantum mechanics for solving relevant physical problems.

The End Semester Examination will be of 3 hour duration and will carry 70 marks. The Question

paper will be divided into three parts A, B and C. Part A will have ten compulsory questions (multiple choice type) covering the whole syllabus (10 X 2 = 20). Part B will have five short answer questions, with one question from each unit. The student is required to answer any four out of them (4 X 5 = 20). Part C will have five long answer questions with one question from each unit. The student is required to answer any three out of them (3 X 10 = 30).

Unit 1: Theory of Scattering: Laboratory and centre of mass reference frames, Differential and total cross sections, scattering amplitudes using green's function, scattering by symmetric potential, Partial wave analysis, Phase shift, scattering amplitudes in terms of phase shift, optical theorem, scattering by square well potential and perfectly rigid sphere; Born approximation, its validity, application to square well potential and Yukawa potential

Units 2: Relativistic Quantum Mechanics: Postulates of Quantum Mechanics, Space time description of Schrodinger Wave Equation, Klein Gordon equation, Dirac equation, covariant form; Plane wave solution; Dirac interpretation of negative energy states and concept of antiparticles; Spin and magnetic moment of the electron, Non relativistic reduction, Helicity and chirality; Properties of γ matrices; Charge conjugation; Normalization and completeness of spinors.

Unit 3: Quantum Field Theory: Second quantization – Lagrangian field theory, Hamiltonian formulation, Quantization of scalar field, Quantization of complex scalar and "Schrodinger" field, Bosons and Fermions

Unit 4: Quantum Chromodynamics I: Introduction to quantum chromodynamics, Quark model

Unit 5: Quantum Chromodynamics II: Standard model, Grand Unified Theories,

Course Outcomes:

Students will have understanding of:

1. Importance of relativistic quantum mechanics compared to non-relativistic quantum mechanics.
2. Various tools to understand field quantization and related concepts.
3. Exposure to quantum field theory and universal interactions.

References:

1. Mathews, P.M. and Venkatesan K.A., Textbook of Quantum Mechanics, Tata McGrawHill (2004).
2. Thankappan, V.K., Quantum Mechanics, New Age International (2004).
3. Sakurai, J.J., Advanced Quantum Mechanics, Pearson Education (2007).
4. Bethe, H.A. and Jackiew, R., Intermediate Quantum Mechanics, Perseus Book Group (1997).

MPHYEC-1BA dvanced Condensed Matter Physics (5 Credits)

Course Objectives:

1. The course is to understand the basic knowledge on crystal structures and sytems
2. Understand the various process techniques available of X-Ray Crystallography

3. Acquire the knowledge of Lattice waves and Polaritons
4. To comprehend the concepts of superconductivity and magnetic properties of solids.

The End Semester Examination will be of 3 hour duration and will carry 70 marks. The Question paper will be divided into three parts A, B and C. Part A will have ten compulsory questions (multiple choice type) covering the whole syllabus (10 X 2 = 20). Part B will have five short answer questions, with one question from each unit. The student is required to answer any four out of them (4 X 5 = 20). Part C will have five long answer questions with one question from each unit. The student is required to answer any three out of them (3 X 10 = 30).

Unit 1: Electron States: Hartree and Hartree-Fock approximations, correlation energy, Screening, plasma oscillations, Dielectric function of an electron gas in random phase approximation, limiting laws &Friedel oscillation

Unit 2: Electron-electron interaction: Lindhard`s expression for wave length and frequency dependent dielectric constant. Static screening, Kohn effect

Unit 3: Superconductivity: Energy gap, Cooper pair, BCS theory, Ginzsburg –Landau theory, Josephson junction and its application, Microscopic quantum interference, High temperature superconductivity

Unit 4: Magnetism: The band model for ferromagnetism and its temperature dependence, Ferrimagnetism, Antiferromagnetism, magnetism effects in nanomaterials.

Unit 5: Dielectric Properties:

Theory of Dielectrics, Piezoelectricity,Ferroelectricity, Antiferroelectricity and their applications, Nano-structured Ferroelectric materials, Synthesis and Characterization principles of Ferroelectric nanomaterials, Multiferroic and Smart materials

Course Outcome:

At the end of this course, students will be able to

1. Basic knowledge of crystal structures and systems
2. Understand the basic idea about the Electronic Properties of Solids
3. Impart the knowledge about the properties magnetic Properties of Solids
4. Understand the applications of superconductivity.

References:

1. Introduction to Solid State Physics, 3rd& 6th Editions. C. Kittel ,Wiley Publishing
2. Condensed Matter in a Nutshell, WilG.D. Mahan, Princetyon Univ. Press 2011.
3. Solid State Physics, W. Ashcroft, N.D. Mermin Holt-Rinehart-Winston 1976.
4. Elementary Solid State Physics, Principles and Applications, Ali Omar.M Addison Wesley Publishing, 2011

MPHYEC– 1C Atmospheric Physics (5 Credits)

Course Objectives:

1. To provide a keen knowledge on atmospheric behavior, description of air, stratification of mass, trace constituents, radiative equilibrium of the planet, global energy budget, and general circulation.
2. To provide a deep insight on physics of atmosphere, aerosols and clouds.
3. To understand the Short wave and long wave radiation, radiometric, lamberts equation, radioactive heating, thermal relaxation and greenhouse effect.

The End Semester Examination will be of 3 hour duration and will carry 70 marks. The Question paper will be divided into three parts A, B and C. Part A will have ten compulsory questions (multiple choice type) covering the whole syllabus (10 X 2 = 20). Part B will have five short answer questions, with one question from each unit. The student is required to answer any four out of them (4 X 5 = 20). Part C will have five long answer questions with one question from each unit. The student is required to answer any three out of them (3 X 10 = 30).

Unit 1: Introduction and Atmospheric Chemistry:

General description and basic facts; Regions of the Atmosphere, Atmospheric chemistry: Composition, Minor constituents, cycles of main elements, chemistry of sulphur, carbon, nitrogen compounds, photochemical pollution, aerosols.

Unit 2: Atmospheric Photo chemistry: Radiation, absorption of radiant energy in the atmosphere, solar radiation, Chapman profile, photochemistry of ionosphere, stratospheric ozone, ozone hole; Greenhouse effect and its consequences, effective temperature.

Unit-3: Atmospheric thermodynamics and Cloud Physics:

Atmospheric system, Application of first law of thermodynamics to air and clouds, main processes in the atmosphere, cooling, potential temperature, adiabatic expansion with condensation, vertical stability, convective instability.

Unit 4: Cloud physics and Atmospheric Electricity: Classification of clouds, growth of drops by condensation, growth by collision and coalescence, warm rain, ice formation, snow, hail and rain by ice process, ice precipitation. Electric field and space charge, Fundamental problem of atmospheric electricity, Thunderstorm electricity, Lightning.

Unit-5: Atmospheric Dynamics:

Principle forces acting on a parcel of air, acceleration of air parcel, equation of motion, continuity equation, scales of motion, important features of large scale atmospheric motion, Large scale mid latitude circulation system, thermal circulation, global circulation pattern, mid latitude cyclones.

Course Outcome:

At the end of the course, students will be able to

1. Acquire knowledge on earth atmosphere governing by physical laws
2. Achieve basic inputs for the global circulation of atmosphere
3. Create a scope to identify new areas of research in the field of atmospheric science

REFERENCES:

1. C. Donald Ahrens, Essentials of Meteorology,Brooks/Cole Cengage Laerning, USA, 2010
2. Murry L. Salby, Fundamentals of Atmospheric Physics, Academic Press, Elsevier, USA, 1996
3. David. G. Andrews, An Introduction to Atmospheric Physics, Cambridge University Press, United Kingdom, 2000.

MPHYEC – 1D Biophysics (5 Credits)

Course Objectives:

1. The course is to understand the basic knowledge on biomolecular
2. Understand the various theoretical modeling techniques involved in biomolecular systems
3. Acquire the knowledge of Structure and function of Proteins, Carbohydrates & Nuclei acid.
4. To comprehend the concepts of Biochemistry and system biology.

The End Semester Examination will be of 3 hour duration and will carry 70 marks. The Question paper will be divided into three parts A, B and C. Part A will have ten compulsory questions (multiple choice type) covering the whole syllabus (10 X 2 = 20). Part B will have five short

answer questions, with one question from each unit. The student is required to answer any four out of them (4 X 5 = 20). Part C will have five long answer questions with one question from each unit. The student is required to answer any three out of them (3 X 10 = 30).

Unit-1: Bioenergetics: Principles of Thermodynamics, redox potential and free energy change of the reactions, Biological energy transducers.

Unit-2: Physical techniques in protein, nucleic acids and polysaccharide structural analysis: UV-Vis spectroscopy, Infrared spectroscopy, Fluorescence spectroscopy, Atomic absorption spectroscopy, Raman spectroscopy, NMR, Mass spectroscopy, Circular dichorism spectroscopy, X Ray Diffraction technique, TEM and SEM .

Unit-3: Centrifugation: Principles, types, Differential and density gradient centrifugation and their applications; Chromatography: Principles, types (Paper, TLC, Affinity, Ion exchange, Gel filtration, GLC, HPLC) and their applications.

Unit-4: Electrophoresis: Principles and types [Polyacrylamide gel electrophoresis (PAGE), SDS-PAGE, agarose gel electrophoresis, 2D electrophoresis and their applications.

Unit-5: Theoretical techniques and their application to Biomolecules: Hard sphere Approximation, Ramchandran plot, Potential energy surfaces, Outline of Molecular Mechanics Method, Brief ideas about semi-empirical and ab-initio quantum theoretical methods, molecular charge distribution, molecular electrostatic potential and field and their uses.

Course Outcome :

At the end of this course, students will be able to

1. Basic knowledge of Biomolecular of chemistry and functions.
2. Understand the basic idea about the Structure and Function of Nucleic Acids.
3. Impart the knowledge about the Function of Carbohydrates and Proteins.
4. Understand the applications of Biomolecules.

References:

1. Principles of Biochemistry by A.L. Lehninger, D.L. Nelson and M.M. Cox, CBS Publishers, New Delhi, 1993.
2. Biochemistry by L. Stryer, W.H. Freeman and Co., Newyork 1997.
3. Biophysics by VasanthaPattabhi and N. Gautham, NarosaPublishmg House, New Delhi, 2002.

MPHYEC– 1E Lasers and Photonics(5 Credits)

Course Objectives:

On successful completion of this course, students will be able to

1. Describe and explain the principles involved in the interactions between light and matter, including the effects of anisotropy and non-linearity-comprehend the modification and control of optical properties of materials by externally imposed electric, magnetic and acoustic fields
2. Recall and recount the optical properties of semiconductor light sources and detectors- expand the theory and applications of the confinement of light in waveguides and fibers

The End Semester Examination will be of 3 hour duration and will carry 70 marks. The Question paper will be divided into three parts A, B and C. Part A will have ten compulsory questions (multiple choice type) covering the whole syllabus (10 X 2 = 20). Part B will have five short answer questions, with one question from each unit. The student is required to answer any four out of them (4 X 5 = 20). Part C will have five long answer questions with one question from each unit. The student is required to answer any three out of them (3 X 10 = 30).

Unit 1: Basic Principles:

Laser rate equation for three level and four level systems, Dynamics of Laser Process: switching Mode, locking, mode pulling, lamb dip, hole burning, Energy levels and radiating properties of molecules: liquids and solids, Laser amplifier, Laser resonators, Techniques of laser excitation.

Unit 2: Optical Systems: Fabrication of electronic components, Material processing; Laser Communication, Holography, Optical encryption and computing, Laser hazards and Laser safety, Laser cooling, Trapping, Optical Sensor, Time-division and wavelength Multiplexing.

Unit 3: Optical Fiber Communication: Optical Fiber structure, Wave guiding in fiber, Fabrication of Fiber, Types of Fiber, Solution of Maxwell's equation inside Fiber, Signal degradation, Dispersion and attenuation in Optical Fibers, Optical communication Network design.

Unit 4: Non-linear optical effects: Harmonic generation, Second harmonic generation, Phase matching, Third harmonic generation, Optical mixing, parametric generation, Self-focusing of light, two photon absorption, Doppler free two photon spectroscopy, Laser spectroscopy.

Unit 5: Photonics & Quantum Optics: Photo detector and Display Devices, Photo transistors, CCD, ILD, PIN diodes, APD, Optical Amplifiers, Optical Modulators, Couplers, Bio sensors.

Course Outcome:

1. Knowledge of fundamental physics of photonics is developed to a high level
2. The course prepares students to be able to use sophisticated instrumentation intelligently, witha good understanding of its capabilities and limitations.

References:

1. Saleh B E A and M C Teich, "Fundamentals of Photonics", John Wiley,New York,1991.
2. Pal B P(Ed.), "Guided Wave Optical Components and Devices", Academic Press,2006.
3. Smith F G and T A King. "Optics and Photonicss",John Wiley,Chicester,2000.
4. Thyagarajan K and A Ghatak, "Nonlinear Optics,in Encyclopedia of Modern Optics(Editors:Bob Guenther etal)",Elsevier Ltd.,2005.

MPHYEC – 1F Measurement and Instrumentation (5 Credits)

Course Objectives:

1. To make the student familiarize with the basics of experimental physics.
2. To make the student familiarize with the basics of electronics.
3. To enable the student to explore the concepts involved in the oscillators.
4. To allow the student to understand the fundamentals of instruments involved

The End Semester Examination will be of 3 hour duration and will carry 70 marks. The Question paper will be divided into three parts A, B and C. Part A will have ten compulsory questions (multiple choice type) covering the whole syllabus (10 X 2 = 20). Part B will have five short answer questions, with one question from each unit. The student is required to answer any four out of them (4 X 5 = 20). Part C will have five long answer questions with one question from each unit. The student is required to answer any three out of them (3 X 10 = 30).

Unit 1: Basic Principles: Measuring Instruments: Accuracy, precision, sensitivity and resolution; Scale, standards and calibration; Uncertainties of measurements and errors, propagation of errors, statistical treatment of random errors, Distribution functions their derivation and properties

Unit-2: Transducers: Temperature, pressure/vacuum, magnetic field, vibration, strain, displacement and force transducers: Principle, construction and working.

Unit-3: Signal conditioning and recovery: Signal level and Impedance matching, Operational amplifier modules for different signal conditioning: addition, subtraction, scaling, differentiation and integration; Log and antilog amplifiers, analog multiplier and applications, instrumentation amplifier; Signal to noise considerations, Filters, Phase Lock Loop, Lock-in amplifier.

Unit-4: Digital signal processing: A/D and D/A convertor, 7107 A/D convertor based DMM, Embedded systems: 8051 microcontroller (basic ideas only). Computer interfacing of science experiments

Unit 5: Computer interfacing of Science Experiments: Real time and Offline Data Processing, Data acquisition systems and Data Loggers: Principle and Design, Passive and Active Instrumentation with examples.

Course Outcome:

At the end of the course,

1. The student should have had a knowledge on the different experimental techniques.
2. The student should have understood the basics of physics involved in experiments
3. The student should be able to apply the concepts of physics and do the interpretation and acquire the result.

References:

1. Measurement, Instrumentation and Experimental desigh in Physics and Engineering- Michael Sayer and AbhaiMansingh, Prentice Hall of India 2005
2. Data Reduction and Error Analysis for the Physical Sciences, P.R. Bevington and K.D Robinson, McGraw Hill, 2003
3. Electronic Instrumentation- H.S. Kalsi, TMH Publishing Co. Ltd. 1997
4. Instrumentation Devices and Systems-C.S. Rangan, G.R. Sharma, V.S.V. Mani, 2nd Edition, Tata McGraw Hill, New

MPHYEC-1G Computational Methods (5 Credits)

Course Objectives:

1. To encourage students to "discover" physics in a way how physicists learn by doing research.
2. To address analytically intractable problems in physics using computational tools.
3. To enhance the various computational technique with programming basic in C to face the world of problems using high performance iteration techniques.
4. To show how physics can be applied in a much broader context than discussed in traditional curriculum.

The End Semester Examination will be of 3 hour duration and will carry 70 marks. The Question paper will be divided into three parts A, B and C. Part A will have ten compulsory questions (multiple choice type) covering the whole syllabus with 2 from each unit (10 X 2 = 20). Part B will have five short answer questions, with one question from each unit. The student is required to answer any four out of them (4 X 5 = 20). Part C will have five long answer questions with one question from each unit. The student is required to answer any three out of them (3 X 10 = 30).

Unit-1: Introduction to C / C++/ Python/ Java programming: Algorithms, structured programming, Constants and variables, arithmetic expressions, input and output statements, logical expressions and conditional statements, iteration, functions, Arrays, Strings, Pointers, I/O functions, Files.

Unit-2: Data interpretation and analysis: Precision and accuracy, error analysis, propagation of errors, least square fitting: linear, polynomial and nonlinear regression, goodness of fit and chi square test, Elementary probability theory, random variables, binomial, poisson and normal distributions.

Unit-3: Finite difference methods: Computer arithmetic, normalized floating point representation, its consequences and pitfalls; Methods of finding roots of equations: Bisection method, Newton-Raphson method, Successive Approximation method; Solution of simultaneous algebraic equations: Gauss Elimination method, Gauss-Siedel iterative method.

Unit-4: Numerical Techniques: Interpolation: Lagrange interpolation, Difference tables, Spline interpolation; Series approximation of functions: Taylor series, Numerical Differentiation, Numerical integration: Trapezoidal rule, Simpson's rule, Numerical solution of Differential Equations: Euler's method, Runge- Kutta methods.

Unit-5: Some application of Numerical methods in Physics: Largest and smallest Eigenvalues, Diagonalisation of matrices, Initial value problems, 2-dimensional Laplace's Equation, Use of spreadsheets for calculations and graphs. Simulation of simple Physics problems, introduction to MATLAB/SCILAB/MATHEMATICA

Course Outcome:

At the end of this course, students will be able to

1. Understand the basic idea about finding solutions using computational methods basics.
2. Learn how to interpret and analyze data visually, both during and after computation.
3. Gain an ability to apply physical principles to real-world problems.
4. Acquire a working knowledge of basic research methodologies, data analysis and interpretation.
5. Realize the impact of physics in the global/societal context.

References:

1. Mathematical methods of physics - J. Mathews and R. L. Walker, Second Edition, Addison-Wesley
2. Mathematical methods for Physicists – G. B. Arfken and H. Weber, Seventh Edition, Academic Press, 2012
3. Introductory Methods of Numerical analysis – S.S. Sastry, Third Edition, Prentice – Hall of India, 2003

4. Programming in ANSI – C, E. Balaguruswamy, Second Edition, Tata McGraw Hill, 1992

MPHYEC– 1H Nano Science (5 Credits)

Course Objectives:

1. The course is to understand the basic knowledge on nanoscience and nanotechnology
2. Understand the various process techniques available of nanostructure materials.
3. Acquire the knowledge of various nano particles process methods
4. To enhance the various analytical technique to understand the nano properties and characteristics

of nano materials.

The End Semester Examination will be of 3 hour duration and will carry 70 marks. The Question paper will be divided into three parts A, B and C. Part A will have ten compulsory questions (multiple choice type) covering the whole syllabus (10 X 2 = 20). Part B will have five short answer questions, with one question from each unit. The student is required to answer any four out of them (4 X 5 = 20). Part C will have five long answer questions with one question from each unit. The student is required to answer any three out of them (3 X 10 = 30).

Unit-1: Introduction and Basic Principles: Definition of Nanomaterials, Properties, Applications and Scope of Nano-science, Quantum size effect, Electron confinement in infinitely deep square well, confinement in one and two dimensional well, idea of quantum well structure, Quantum wells, quantum wires and Quantum Dots: Preparation and properties; Conduction electrons and dimensionality, Properties dependent on density of states. Carbon nanostructures: Fullerenes, structure, Superconductivity in C60, Carbon nanotubes: synthesis and structure, Electrical and Mechanical properties, Graphene.

Unit-2: Synthesis: Techniques for synthesis: Top down approach: Ball milling; Bottom up approach: Chemical methods of synthesis, RF Plasma and Pulsed Laser techniques, Biological methods: synthesis using microorganisms, and plant extracts.

Unit-3: Characterization Techniques: Characterization tools for nanomaterials: Thermal analysis: DTA, DSC, TGA, dilatometry; Electrical measurements: LCR meter, electrometer amplifier; Optical, UV-Visible spectroscopy, IR spectroscopy, Ellipsometry, Raman Photoluminescence and spectroscopy, Atomic absorption spectroscopy, Structural characterization: X-ray Diffractometer; Magnetic characterization: Vibrating sample magnetometer; TEM, SEM, STM, AFM.

Unit-4: Magnetic Nanomaterials: Magnetic nanoparticle, multiferroic and smart materials, Elementary idea of NEMS and nanotransistors

Unit-5: Dielectric and Multiferroic materials: Theory of Dielectrics, Piezoelectricity, Ferroelectricity, Anti-Ferroelectricity and their applications, Nano-structured Ferroelectric materials, Synthesis and Characterization, techniques of Ferroelectric nano-materials, multiferroic and smart materials

Course Outcome:

At the end of this course, students will be able to

1. Basic knowledge of Nanoscience and nanotechnology
2. Under the basic idea about the nano structure
3. Impart the knowledge about the properties and characteristics techniques of nano materials
4. Understand the applications of nanomaterials.

References:

1. Nanostructure and Nanomaterials, synthesis properties and application, 2nd Edition, Author by Guozhong Cao &yingwang, Published by world scientific published, printed in 2004 Singapore.
2. Hand book of Nanotechnology, 3rd edition Author by Bhusha, Published in springer, printed 2004

German.

3. Nanostructure materials, processing, properties and potential applications, 2nd Edition, Author by Carl C Koch, Published by William andrew publications, printed in 2007 US.
4. Nanomaterials, synthesis, properties and applications 2nd Edition, Author by A.S. Edelstein, Publised by Insitute of physics publishing Bristol and Philadelphia, printed in 2000 UK.

MPHYEC– 1I Plasma Physics(5 Credits)

Course Objective:

1. To expose the students to theory related to motion of charge particle in inhomogeneous field, production of plasma and usage of plasma.

The End Semester Examination will be of 3 hour duration and will carry 70 marks. The Question paper will be divided into three parts A, B and C. Part A will have ten compulsory questions

(multiple choice type) covering the whole syllabus (10 X 2 = 20). Part B will have five short answer questions, with one question from each unit. The student is required to answer any four out of them (4 X 5 = 20). Part C will have five long answer questions with one question from each unit. The student is required to answer any three out of them (3 X 10 = 30).

Unit 1: Basics (Single Particle Approach): Charged particles in uniform and non-uniform electromagnetic field, Plasma - the forth state of matter, Concept of electron and ion temperature, Debye Length, Cyclotron Frequency, Larmor radius, Drift velocity of guiding center, Magnetic moment Magnetic mirror systems and their relation to the plasma confinement, Adiabatic Invariants.

Unit 2: Magneto Hydro Dynamics (Fluid Approach): Introduction to ideal MHD systems, Fundamental equations of magneto hydrodynamic systems, Diffusion and mobility of charged particles in plasma, Plasma as fluid and MHD equations, Approximations and linearization of MHD from dimensional considerations, Single fluid MHD equation.

Unit 3: Waves and instabilities in plasma: Waves in unmagnetised plasma, Energy transport, Ion acoustic waves and MHD waves, Issue of plasma stability and the use of normal mode to analyze stability, Interaction between plasma particles, Perturbation at two fluid interface, Rayleigh Taylor instability, Kelvin Helmholtz instability and Jeans instability.

Unit 4: Kinetic Theory: Need for kinetic theory, Meaning of f(v), Phase space for many particle motion, Velocity and space distribution function,Equations of Kinetic Theory and Vlasov equations for fluid dynamics, **Fluid description of plasmas, Moment equations,**Derivation of fluid equation and Electron-ion plasma oscillation frequency, Derivation of Landau damping.

Unit 5: Applications: Saha's theory of thermal ionization, Application in Space Science, Controlled Thermonuclear Fusion, Magnetic reconnection, Dynamo action.

Course Outcomes:

Students will have understanding of:

1. Theoretical method to study the charge particle motion.

2. Process to generate plasma in the laboratory.

3. Mechanism plasma production is helpful to make fusion reactors.

References:

1. A. R. Choudhari, The Physics of fluids and plasma, Cambridge Univ. Press, 1998.
2. J. A. Bittencourt, Fundamentals of Plasma Physics, Pergamon Press, 1988.
3. F. F. Chen, Introduction to Plasma Physics, Plenum Press, 1984.
4. Paul Bellan, Fundamentals of Plasma Physics, CUP, 2006.

MPHYEC– 1JCrystal Physics and X – Ray Crystallography (5 Credits)

Course Objectives:

Structural analysis is the first step in the characterization of any material. The atomic structure of a material depends on the method of synthesis and on various parameters involved in the technique.

This course will

1. Introduce the fundamental concepts of crystal structure
2. To understand the diffraction principle and use of X-rays
3. To understand the symmetry and space groups
4. To know about lattice representation and reciprocal lattices
5. To determine and analyse the crystal structure using x-ray diffraction

The End Semester Examination will be of 3 hour duration and will carry 70 marks. The Question paper will be divided into three parts A, B and C. Part A will have ten compulsory questions (multiple choice type) covering the whole syllabus (10 X 2 = 20). Part B will have five short answer questions, with one question from each unit. The student is required to answer any four out of them (4 X 5 = 20). Part C will have five long answer questions with one question from each unit. The student is required to answer any three out of them (3 X 10 = 30).

UNIT – 1:GEOMETRY OF CRYSTALS

Introduction, lattice, crystal systems, symmetry, primitive and non-primitive cells, lattice directions and planes, unit cells of hcp and ccp structures, constructing crystals, some simple ionic and covalent structures, Representing crystals in projection

UNIT – 2: CRYSTAL SYMMETRY

Symmetry, symmetry elements & symmetry operations; point &space groups; Bravais lattices&crystal structures, Symmetry of the fourteen Bravais lattices, coordination of Bravais lattice points, space filling polyhedral,thirty-two crystal classes, centres and inversion axes of symmetry, crystal symmetry and properties, translation symmetry elements, Quasiperiodic crystals or crystalloids

UNIT-3: LATTICE REPRESENTATIONS

Indexing lattice directions, lattice planes, miller indices, zones, zone axes, zone law, transforming miller indices and zone axes symbols, reciprocal lattice vectors, reciprocal lattice, unit cells, for cubic crystals, proofs of some geometric relationships using reciprocal lattice vectors, Addition rule, Weiss zone law, d spacing of lattice planes, steoreographic projection

UNIT – 4: X- RAYS DIFFRACTION

Diffraction, Bragg's law, diffraction methods, scattering by electrons, atoms, unit cell, Introduction to X-rays, electromagnetic radiation, continuous spectrum, characteristic spectrum, absorption, filters, production of X-rays, detection of X-rays, safety precautions, Contributions of Laue, Bragg and Ewald to X-ray diffraction, Indexing of X-ray diffraction pattern

UNIT – 5: CRYSTAL DEFECTS

Point defects, line defects, planar faults, stacking faults and twins, role of dislocations in Plastic deformation and crystal growth, colorcenters.

Course Outcomes:

Student would have understood

1. The structure of various crystals
2. Know the theoretical framework like symmetry and space groups
3. Know to characterize the crystal using X-ray diffraction experiments and
4. Also would be able analyze the collected experimental data

References:

1. C. Hammond, The basics of Crystallography and diffraction, Oxford university press, New York (2009).
2. B.D. Cullity, Elements of X-ray diffraction, Addison Wesley, Massachusetts (1956).
3. C. Suryanarayana, M.G. Norton, X-ray diffraction – A practical approach, Plenum press, New York (1998).
4. C. Kittel, Introduction to solid state physics, 7th Ed., Wiley India, New Delhi (2004).

MPHYEC-1K Energy Science (5 Credits)

Course Objectives:

This course will

1. Enable the students to appreciate the importance of solar energy and renewable energies.

2. Provide an understanding of essential components of renewable energy applications and limitations.

The End Semester Examination will be of 3 hour duration and will carry 70 marks. The Question paper will be divided into three parts A, B and C. Part A will have ten compulsory questions (multiple choice type) covering the whole syllabus (10 X 2 = 20). Part B will have five short answer questions, with one question from each unit. The student is required to answer any four out of them (4 X 5 = 20). Part C will have five long answer questions with one question from each unit. The student is required to answer any three out of them (3 X 10 = 30).

UNIT 1. Solar Energy: Fundamental and Material Aspects: Fundamentals of photovoltaic Energy Conversion Physics and Material Properties, Basic to Photovoltaic Energy Conversion: Optical properties of Solids. Direct and indirect transition semicondu ctors, interrelationship between absorption coefficients and band gap recombination of carriers.

UNIT 2. Solar Energy: Different Types of Solar Cells:

Types of Solar Cells, junction solar cell, Transport Equation, Current Density, Open circuit voltage and short circuit current, Brief description of single crystal silicon and organic and Polymer Solar Cells, Ele mentary Ideas of Advanced Solar Cells e.g. Tandem Solar cells, Solid Liquid Junction Solar Cells, Nature of Semiconductor, Principles of Photo-electrochemical Solar Cells.

UNIT 3. Hydrogen Energy: Fundamentals, Production and Storage:

Relevance in relation to depletion of fossil fuels and environmental consideration. Solar Hydrogen thro ugh Photoelectrolysis, Physics of material characteristics for production of Solar Hydrogen. Brief discu ssion of various storage processes, special features of solid hydrogen storage materials, Structural and electronic characteristics of storage materials. New Storage Modes.

UNIT 4. Hydrogen Energy: Safety and Utilization:

Various factors relevant to safety, use of Hydrogen as Fuel, Use in Vehicular transport, Hydrogen for Electricity Generation, Fuel Cells, Various type of Fuel Cells, Applications of Fuel Cell, Elementary concepts of other Hydrogen Based devices such as Hydride Batteries.

UNIT 5: Other Renewable Clean Energies:

Elements of Solar Thermal Energy, Wind Energy and Ocean Thermal Energy Conversion.

Course Outcome:

The students will be able to

1. Understand the importance of solar energy and renewable energies.
2. Understand essential components of renewable energy applications and limitations.
3. Design renewable energy systems as requirements.
4. Contribute towards reduction of our dependence on conventional energy sources.

References:

1. Kreith and Kreider, Principles of Solar Engineering, McGrew Hill Pub.,
2. A.B.Meinel and A.P.Meinal, Applied Solar Energy.,
3. M.P.Agarwal, Solar Energy, S.Chand& Co.,
4. S.P.Sukhatme, Solar Energy, TMH.,
5. G.D.Rai, Non-conventional Energy sources, Khauna Publications, Delhi.

MPHYEC-1L Environmental Physics (5 Credits)

Course Objectives:

This course will

1. Enable the students to learn the concepts of sustainable development and coexistence with nature.
2. Enable the students to gain abilities to reduce environmental pollution.
3. Enable the students to understand the source of solar and terrestrial radiation.
4. Enable the students realize the hazards associated with depleting Ozone layer, and the factors responsible for the depletion of Ozone layer.
5. Enable the students to understand the importance of trees.
6. Enable the students to realize the importance of renewable energy sources like solar, wind and biogas.

The End Semester Examination will be of 3 hour duration and will carry 70 marks. The Question paper will be divided into three parts A, B and C. Part A will have ten compulsory questions (multiple choice type) covering the whole syllabus (10 X 2 = 20). Part B will have five short answer questions, with one question from each unit. The student is required to answer any four out of them (4 X 5 = 20). Part C will have five long answer questions with one question from each unit. The student is required to answer any three out of them (3 X 10 = 30).

UNIT-I Essentials of Environmental Physics : Structure and thermodynamics of the atmosphere, Composition of air, Greenhouse effect, Transport of matter, energy and momentum in nature, Stratification and stability of atmosphere, Laws of motion, hydrostatic equilibrium, General circulation of the tropics. Elements of weather and climate of India.

UNIT-2 Solar and terrestrial Radiation : Physics of radiation, Interaction of light with matter, Rayleigh and Mie scattering, Laws of radiation (Kirchoffs law, Planck's law, Beer's law, Wien's displacement law, etc.) Solar and terrestrial spectra, UV radiation, Ozone depletion problem, IR absorption energy balance of earth atmosphere system.

UNIT-3 Environmental pollution and degradation: Elementary fluid dynamics, Diffusion, Turbulence and turbulent diffusion, Factors governing air, water and noise pollution. Air and water quality standards. Waste disposal, Heat island effect, Land and see breeze, Puffs and plumes, Gaseous and particulate matters, Wet and dry deposition.

UNIT-4 Environmental Changes and Remote Sensing : Energy sources and combustion processes, Renewable sources of energy, Solar energy, Wind energy, bioenergy, Hydropower, Fuel cells, nuclear energy, Forestry and bioenergy.

UNIT-5 Global and Regional Climate: Elements of weather and climate, Stability and vertical motion of air, Horizontal motion of air and water, Pressure gradient forces. Viscous forces, Inertia forces, Reynolds number, Enhanced Greenhouse effect, Energy balance- a zero-dimensional Greenhouse model.

Course Outcome:

The students will be able to

1. Understand the importance of basics of environmental processes.
2. Get opportunities of working metrological stations and even establish metrological stations

in remote places for better future.

3. Develop his/her understanding of global and regional climate change.

References:

1. Egbert Boeker and Rienk Van Groundelle, Environmental Physics John Wiley
2. J. T. Hougtion, The physics of atmosphere, Cambridge University Press, 1977.
3. J. Twidell and J. Weir, Renewable energy resources, Elbs, 1988.
4. R. N. Keshavamurthy and M. Shankar Rao, The physics of monsoons, Allied publishers, 1992.
5. G. J. Haltiner and R. T. Williams, Numerical weather prediction, John Wiley, 1980.

PATNA UNIVERSITY

Programme – MASTER OF SOCIAL WORK (MSW)

Course Structure based on Choice Based Credit System (CBCS)

Semester – I

Core Course - CC 1 – History & Philosophy of Social Work

Course Content

Unit – I	Concept, Meaning, Objectives & Scope of Social Work, Principles, Values and Philosophy of Social Work.
Unit – II	Role & practices of social work profession, Welfare Vs Development Orientation of Social Work, Professional code of ethics, Social Work professional as a change agent, Challenges of Social Work as a Profession.
Unit – III	Units of social work intervention in individual, family, group and communities.
Unit – IV	Historical Development of Social Work; U.K., U.S.A. & India
Unit – V	Social service and reform tradition in India- ancient, medieval & modern period; social reform movements – Brahmo Samaj, Arya Samaj, Aligarh Movement & Dalit Movement.

Books Recommended:

1. Desai, M. Ideologies and Social Work: Historical and Contemporary Analyses, Jaipur Rawat Publication
2. Govt. of India – Encyclopaedia of Social Work in India.
3. Khan, A.J. - Ideas and Issues in Social Work.
4. Khinduka, S.K. - Social Work in India.
5. Mishra, P.D. - Social Work: Philosophy and Methods.
6. Mishra, P.D. - Social Work Profession in India.
7. **,-,u- flag ,oa ,-ch- flag & lektdk;Z**
8. **ckys'oj ik.Ms; & lektdk;Z ,d lexz n`f"V**
9. **ef.k Hkw"k.k ik.Ms; & lektdk;Z% n'kZu] fl¼kar ,oa vH;kl**

Semester – I

Core Course - CC 2 – Sociology for Social Work

Course Content

Unit – I	Sociology: Meaning and scope, Sociology and its interdisciplinary perspectives relating to other social sciences, society as a system of relationship.
Unit – II	Indian Society: features, Unity in Diversity. Types of society: tribal, rural and urban.
Unit – III	Indian Culture: features and elements. Customs, traditions and values. Social control: concept, means and agencies.
Unit – IV	Socialization: meaning, process, stages and agencies. Institutions: Marriage & Family.
Unit – V	Social Change: meaning, characteristics and factors. Sanskritization, Westernization and Secularization.

Books Recommended:

1. MacIver and Page- Society.
2. Merton- Social Theory and Social Structure
3. Sharma,S.R.- Basic Concepts of Sociology (The Hindu View).
4. Sorokin- Contemporary Sociological Theories.
5. Srinivas, M.N.- Social Change in India.
6. **,-,u-flag ,oa usgk xxZ & ekuo laca/ksa ds vf/dkj**
7. **ts-ih- flag & lekt'kkL=k vo/kj.kk,i ,oa fl¼kUr**
8. **v'ks"k nkl xqIrk & lekt'kkL=k dh ewyHkwr vo/kj.kk,a**

Semester – I

Core Course - CC 3 – Research Methodology in Social Work

Course Content

Unit – I Social Research & Social Survey: Meaning, purpose and its relevance to social work practice. Types of research: Pure, Applied and Action, Social Work Research: Meaning & Steps.

Unit – II Hypothesis, meaning and types, Sampling: meaning and types.

Unit – III Tools of data collections: questionnaire and schedule. Methods of Data Collection: Observation, interview and case study.

Unit – IV Research Design - Meaning and Types

Unit – V Report writing: Objectives, importance, contents & precautions.

Books Recommended:

1. Bailey, Kenneth D. – Methods in Social Research.
2. Good, W.J. and Hatt, P.K. - Methods in Social Research.
3. Young, P.V.- Scientific Social Surveys and Research.
4. MacMillan- Statistical Methods of Social Work.
5. A.N. Singh and Ashish Ranjan - Research Methodology
6. **,-,u-flag ,oa oh-ds- flag & lkekftd vuqla/ku**
7. **jke vgqtk & lkekftd vuqla/ku**

Semester – I

Core Course - CC 4 – Statistics and Computer Application

Course Content

Unit – I Statistics: Meaning, Signification, Uses and limitations. Diagrammatic representation of data.

Unit – II Measures of Central Tendencies - Mean, Median and Mode.

Measures of Dispersion - range, quartile deviation, mean deviation and standard deviation.

Unit – III Co-efferent of correlation, Karl Pearson and Spearmon's rank correlation.

Unit – IV Chi-Square Test.

Part - B

Unit – V Computer: Definition, Types and Generations. Use of computer and Internet in social work practice. MS-Office: MS Word, MS-Excel & MS - PowerPoint

Books Recommended:

1. Bailey, Kenneth D.- Methods of Social Research.
2. Good, W.J. & Hatt, P.K.- Methods in Social Research.
3. Young, P.V.- Scientific Social Surveys and Research.
4. Croxton & Cowden- Applied General Statistics.
5. MacMillan- Statistical Methods of Social Work.
6. Computer Today
7. Basndra, S.K.- Computer for Managers.
8. **,-,u- flag ,oa usgk xxZ & lkaf[;dh ds fl¼kar**
9. **eqgEen lqyseku & euksfoKku] f'k{kk ,oa vU; lkekftd foKkuksa esa lkaf[;dh**

Semester – I

AECC – 1 Environment and Sustainability

Course Content

Unit – I	Sources of Air, Water and Soil Pollutions and their Mitigations, Noise Pollution
Unit – II	Global Warming, Ozone depletion and Acid rain
Unit – III	Current Environmental Issues and movements in India: Chipko movement, Silent Valley, Narmada Dam, Tehri Dam, Almeti Dam etc.
Unit – IV	Solid Waste Management
Unit – V	Global Environmental Movements: Biodiversity, Conservation and Agenda 21, Paris Convention, Montreal Protocol etc.

A few topics for assignment: Air Pollution and their Mitigation, Water Pollution and their Mitigation, Climate Change, Water Resources, Green House Effect, Global Warming and Renewable and non-renewable energy resources

Semester – II

Core Course - CC 5 – Social Case Work

Course Content

Unit – I Social Case Work: Meaning, purpose, principles and components

Unit – II Social Case Work process - study, assessment, goal formations, planning, intervention, evaluation, termination and follow up.

Unit – III Approaches of social case work: Psycho-analytical, Behavioral-modification and Eclectic

Unit – IV Techniques of Social Case Work. Client-worker relationship, Management of transferences & counter-transferences. Counselling - Meaning, Methods & Role of Social Workers

Unit – V Role of Social Case Worker in various settings; juvenile, elderly & school.

Books Recommended:

1. Goldstein, H.- Social Work Practice: A Unitary Approach. Columbia, South Corolina, University of South Corolina Press.

2. Hollis, Florence- Case Work: A Psychological Therapy.

3. Perlman, H.- Social Case Work Skills.

4. Pincus, A. and Anne Minaham- Social Work Practice: Models and methods.

5. Timms, N- Social Case Work: Principles and Practice.

6. Timms,N.- Recording in Social Case Work.

7. Mathew, Grace – An Introduction of Social Case Work

8. **,-,u-flag ,oa ,-ih- flag & lektdk;Z**

9. **ckys'oj ik.Ms; ,oa rstLdj ik.Ms; & lkekftd oS;fDrd lsok dk;**Z

10. **ç;kxnhu feJ& lkekftd oS;fDrd lsok dk;Z**

Semester – II

Core Course - CC 6 – Human and Social Development

Course Content

Unit – I	Human Development: Meaning, objectives, indicators, human rights and development, theories of human development.
Unit – II	Social Development: Concept, objectives and indicators, Approaches to social development: i) Unified ii) basic needs and iii) holistic
Unit – III	Sustainable development: Concept & Practices
Unit – IV	Governmental measures under 5 Yrs. plan, Panchayati Raj Institutions: Background, objectives and organizational set-up.
Unit – V	Liberalization, Privatization and Globalization: concepts, characteristics, importance & limitations.

Books Recommended:

1. Jacob, K.K.-(ed.) - Social Development in India.
2. UNDP- Human Development Reports.
3. World Bank- World Development Reports.
4. Sanaswate,T.S. (ed.)- Culture, Socialization and Human Development, New Delhi: Sage Publications.
5. Nayak, R.K. and SIdiqui,H.Y.(eds)- Social Work and Social Development, New Delhi: Gitanjali Publishing House.
6. S.K. Pant – Human Development
7. M.H.Syed – Social Development
8. M.S. Gore – Social Development

Semester – II

Core Course - CC 7 – Social Work with Groups

Course Content

Unit – I	Social group: Meaning, characteristics and classification.
Unit – II	Social group work: Meaning, characteristics, objectives and importance.
Unit – III	Models of group work – Remedial, Reciprocal and Social goal.
Unit – IV	Basic group processes – Pre-group formation, beginning, middle and working phase. Sub-group, Group conflict, Group decision making, Leadership skills in group dynamics.
Unit – V	Group Work Practice in Alcoholism, elderly care & Psychiatric settings.

Books Recommended:

1. Cartwright, Dorwin and Zander, Alwin (1995). Group dynamics. New York: Row, Peterson & Co.
2. Bhatt R.M. (1960). Records of group work practice in India. Baroda: Baroda University.
3. Doel, M. & Sawda, C. (2003). The essentialsof group worker. London: Jessica Kingsley Publication.
4. Dougles, T. (1978). Basic Group Work. London: Tavistock Publication.
5. Northen, H. (1976). Theory of social work with groups. New York: Columbia University Press.
6. **ç;kxnhu feJ& lkekftd lkewfgd dk;Z**
7. **ckys'oj ik.Ms; ,oa rstLdj ik.Ms; & lkekftd lkewfgd lsok dk;**

Semester – II

Core Course - CC 8 – Social Work with Communities

Course Content

Unit – I Community organization: History, Concept, Principles, Assumptions and objectives – Community Organization and Community Development – Process of community organization – Study, Survey & Analysis.

Unit – II Models of community organization: locality development, social planning & social action. Community organization with slums dwellers and transgender.

Unit – III Community organization methods: Awareness creation, planning, organizing, education, networking, participation & leadership.

Unit – IV Gandhian and Ambedkar ideologies.

Unit – V Concept of advocacy: Strategies and tools.

Books Recommended:

1. Gangrade, K. D. (1997) Community organization in India, New Delhi: Popular Prakashan.
2. Johri, Pradeep Kumar (2005) Social Work and Community organization. New Delhi, Anmol Publication Pvt. Ltd.
3. Kumar, Jha Jainendra (2002) Social Work and community development New Delhi: Anmol Publication Pvt. Ltd.
4. Ledwith, Margaret. (2005) Community development: A critical approach, New Delhi, Rawat Publication.
5. Sidddique, H.Y. (1977) Working with communities, New Delhi, Heera Publication.
6. Kumar, Somesh (2008) Methods for community participation. New Delhi, Vistar Publications.
7. **,0 ,u0 flag& lkeqnkf;d laxBu**

Semester – II

Core Course - CC 9 – Human Resource Management

Course Content

Unit – I	Human Resource Management: Concept, characteristics, objective, importance, scope & future challenges and function of Human Resource Management. Human Resource Development: features and roles.
Unit – II	Human Resource Planning: Meaning, need, importance & process.
Unit – III	Job Analysis: Meaning, uses, job description, job specification and job satisfaction
Unit – IV	Recruitment: Meaning, objective, sources, merits & demerits. Selection and its procedure. Training & Development: Meaning, importance and types
Unit – V	Performance Appraisal: Meaning, purpose and techniques. Promotion, transfer and termination. Grievance and their redressal. Disciplinary Action and its procedure.

Books Recommended:

1. Agarwal, D.- Dynamics of Labour Relations in India.
2. Flippo, E.B.- Personnel Management.
3. Moorthy,M.V.-Human Resource Management- Psychological Social Work Approach.
4. Martin, John (2010) Key concepts in human resource management, London: Sage Publications.
5. Mathis, R.L., & Jackson, J.H. (1997) Human Resource Management, U.K. Prentice Hal International.
6. A.M. Sheikh (2009) – Human Resource Development and Management, S. Chand & Co. Pvt. Ltd.
7. कामेश्वर पंडित एवं प्रीति रैना– मानव संसाधन प्रबंध, साहित्य भवन पब्लिकेशन, आगरा

Semester – II

AEC– 1

A student can choose one from the basket of AEC-1/SEC-1 prescribed by the university vide para no. 2.6 (Table No. 4) of the approved ordinance and regulation.

Semester – III

Core Course - CC 10 – Social Policy and Planning

Course Content

Unit – I Concept of social policy, social welfare policy and economic, Preamble of the Indian Constitution and fundamental rights & duties.

Unit – II Approaches to social policy: Unified, integrated and sectoral approaches. Models of social policy: i) Individual welfare ii) Achievements performance model iii) Institutional redistributive model.

Unit – III Policies concerning youth, elderly & physically challenged and their protection and social accountability.

Unit – IV NITI Ayog: Its organization, structure and functions.

Unit – V Promotion of local self-governance and ensuring decentralized planning through the 73rd and 74th Constitutional Amendments.

Books Recommended:

1. Gosh, A- Planning in India: The Challenges for the Nineties.
2. Jacob, K.K.(ed.)- Social Policy in India.
3. Jones, K. et al.- Issues and Social Policy.
4. Kulkarni, P.D.- Social Policy in India.
5. Misra, R.- Society and Social Policy.
6. Singh,Surendra, Misra, P.D. & Singh, A.N.- Bharat Mein Samajik Niti, Niyojan Evam Vikas.

Semester – III

Core Course - CC 11 – Human Rights and Social Legislation

Course Content

Unit – I Human Rights: Concept, Scope – Classification of Human Rights – UNCRC – United Nations Convention on the Right of the child. CEDAW – Convention of the elimination of all forms of discrimination against women. National Commission for protection of child rights.

Unit – II Contemporary Issues: Rights of Children, Women, Dalits. People living with HIV/AIDS – Prisoners, Refugees and Persons with Disability.

Unit – III Social Legislation: Meaning and Scope. Family Courts, Lok Adalats, The Legal Aid, Public Interest Litigation – Right to Information Act (2005). Right to Education (RTE). Comprehensive social security and food & nutrition security.

Unit – IV POCSO – The protection of children from sexual offence Act 2012. Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act 2013 The Rights of Persons with Disabilities Act 2016, Prevention of Immoral Traffic Act (1986).

Unit – V Protection of Civil Rights Act (1955) – Protection of Consumer Act (1986). The Environment Protection Act, 1986

Books Recommended:

1. Aish Kumar Das, 2004 - Human Rights in India Sarup and Sons, New Delhi
2. Chitranjivi J. 2002 - Human Rights in India, Oxford University Press, New Delhi
3. Kohli A.S. (2004) - Human Rights and Social Work Issues, Society for Community Organization, Madurai.
4. Rajamuthirulandi (1998) - Human Rights and Constitution. Sooriya Publishers. Trichy
5. Susan C. Mapp (2008) - Human Rights and Social Justice in a Global World. Oxford University Press, New Delhi
6. Upendra Bakshi (2007) - Human Rights in a Post Human World. Cambridge University Press New Delhi.
7. Subhash Chandra Singh - Social Justice and Human Rights in India
8. Chiranjivi J. Nirmal - Human Rights in India

Semester – III

Core Course - CC 12 – Social Pathology and Population Studies

Course Content

Unit – I	Social Evils: Dowry, Alcoholism and Drug Addiction - meaning, causes & concerned laws. Forms of violence against Women. SCs & STs: Problems and measures.
Unit – II	Sex-Workers: meaning, causes, effects, preventive measures, HIV/AIDs, Role of social worker in solution of social problems; preventive care and rehabilitation.
Unit – III	Concepts of fertility, mortality and migration & factors affecting them. National Population Policy 2000.
Unit – IV	Theories of Population: - Malthus & Marx.
Unit – V	Family Welfare in India: Methods, programmes and role of voluntary organizations/ NGOs and social workers in Family Welfare Programme in India.

Books Recommended:

1. Agarwal, S.N.- India's Population.
2. Mamsona- Population and Family Planning in India.
3. Prasad, R.K.- Population Planning, Policy and Programmes.
4. Reddy Laxmi- Population Education.
5. G.R. Madan – **Social Problems in India**
6. C.B. Memoria – **Social Problems in India**
7. **lqHkk"k 'kekZ & efgyk vkSj lekt% n'kk ,oa fn'kk**
8. **jke vkgwtk & lkekftd leL;k,¡**

Semester – III

Core Course - CC 13 – Rural Community Development

Course Content

Unit – I	Rural Community: Demographic, social, economic and cultural characteristics; problems of rural community: poverty, illiteracy, housing, sanitation, unemployment, indebtedness
Unit – II	Programmes and schemes of rural development: MNREGA, Ayushman Bharat, Ujjawala Yojna, Mahila Samridhi Yojna, ICDS, Annapurna scheme, NHM, SHGs (Self Help Group)
Unit – III	Role of co-operative societies, Banks, Cottage and Small Scale Industries in rural development.
Unit – IV	Models of Rural Development, Structure and functioning of rural development.
Unit – V	Working of Panchayati Raj Institutions, emerging problems and issues in rural reconstruction and development.

Books Recommended:

1. Ahuja, R.- Indian Social System.
2. Ahuja, R.- Society in India: Concepts,Theories and Recent Trends.
3. Bateille, Andre- Caste & Power.
4. Desai, S.S.M.- Rural Banking in India.
5. Dube, M.K.- Rural and Urban Development in India.
6. Govt. of India- Panchayat Raj at a Glance.
7. Sundaram, I.S.- Rural Development.

Semester – III

Core Course - CC 14 – Urban Community Development

Course Content

Unit – I Urban Community: meaning, characteristics and changing structure. Rural-urban continuum.

Unit – II Urbanization: meaning, characteristics, factors and challenges. Issues of slums

Unit – III Major Agencies of Urban Development: HUDCO, Banks, Industries & Voluntary agencies.

Unit – IV National Policy of Urbanization and Housing. Smart City Mission.

Unit – V Urban - Local Self-government: Municipal Corporations, Municipalities, Nagar Parishad, Cantonment & Notified Area.

Books Recommended:

1. Bhattacharya, M.- Essays on Urban Government.
2. Dubey, M.K.- Rural and Urban Development in India.
3. Gore, M.S.- Urbanization and Social Change.
4. Report of Rural and Urban Relationship Committee- Study of Master Plans of Towns and Cities of India.
5. Mukhopadhyaya,A.- Municipal Government and Urban Development.
6. Mohanty B: Urbanization in Development Countries, Concept Publishing Company, New Delhi
7. Asthana M. and Ali, Sabir, Urban Poverty in India, Mittal Publication New Delhi, 2003

Semester – III

AECC – 2

Human Values & Professional Ethics (3 Credit)

& Gender Sensitization (2 Credit)

Semester – IV

Course Content

EC **Major Project Dissertation and Viva-voce (Based on fieldwork of any one area)**

- **A- Human Resource Management**
- **B- Rural Community Development**
- **C- Urban Community Development**

DSE 1 **CC-5 of other Department of Social Sciences or selected from SWAYAM PG courses.**

OR

GE-1

Understanding Families and Children

Course Content

Unit – I	Defining Families, Common characteristics – Family Rituals, Family Traditions, Family Functions and Family Structures. Diversity of Families: Nuclear Family, Joint Family and Extended Family.
Unit – II	Premise and Origins – Psychological Theories, Role Theory, Structural Theories and Social Exchange Theories.
Unit – III	Definition Types of Marriage, Marital Dynamics, Working parents, Socialization of Children, Feminist and Gender perspectives on families.
Unit – IV	Concept and meaning Psychoanalytic child development theories: Sigmund Freud, Erik Erikson, Stages and Dimensions of Child Development: Physical, Motor, Cognitive, Language, Social and Emotional Development
Unit – V	Parent- Child Relationship, Child Rearing Practices, Issues and Concerns of Children. Children in families experiencing domestic violence.

Books Recommended:

1. Iman, R. Pittin & Omelet, H. (1985). Women and Family, Nigeria: Codersia Book Series.
2. Roy, Kalpana (2000) Women and Child Development, New Delhi, Common Wealth Publications.
3. Barik, S. (2011) Domestic Violence in India, Delhi: Adhyayan Publishers and Distributors
4. Gomango, S.P. (2005) Consequences of Child Maltreatment, New Delhi: Authors Press
5. Patel, Tulsi (2005) The Family in India: Structure and Practice, Delhi: Sage Publications.

OR

Industrial Relation

Course Content

Unit – I	Industrial Relations: Concepts, system approach & Gandhian Approach.
Unit – I I	Industrial Disputes: Meaning, Causes, Effects and Types: Strike, Lock-out, retrenchment, layoff, closure, termination of services. Legal machineries for dispute settlement- conciliation, arbitration and adjudication.
Unit – III	Trade Union: Objectives, Structure & Functions, Historical Development of Trade Union Movement in India Recognition of Trade Unions.
Unit – IV	Worker's participation in management - meaning, different levels of participation, Bi-partile negotiation - Meaning process.
Unit – V	Labour Legislations, meaning, scope and principles, Factory's Act 1948, Minimum Wages Act 1948. Trade Union Act 1926, Employee's State Insurance Act 1948, Payment of Wages Act, 1936, Payment of Bonus Act, 1965.

Books Recommended:

1. Agarwal, D.- Dynamics of Labour Relations in India.
2. Memoria, C.B.- Dynamics of Industrial Relations.
3. Myres,C.A.- Industrial Relations in India.
4. Rao, Venugopal and Prasad Ram- Trade Unionism in India.
5. Goswami, V.G.- Labour and Industrial Laws.
6. Mishra, Srikat- Dynamics of Industrial Relations, Trade Unions and Labour Welfare in India.
7. Saxena, R.C. – Labour Problems and Social Welfare.
8. **x.ks'k ik.Ms; & vkS|ksfxd lekt'kkL=k**
9. **vkj0ih0 'kekZ & vkS|ksfxd lekt'kkL=k**

OR

Social Work and Disaster Management

Course Content

Unit – I Disaster: Meaning and level of development, Types of Disaster.

i) Natural famine, Drought, Flood, Cyclone, Earthquake, Storm.

ii) Man Made - Riots, Biological Warfare, Military Insurgency, Terrorism, Industrial Mishaps.

Unit – II Impact of Disaster: Physical, Economic, Spatial, Psycho-social.

Unit – III Concept of Civil society, co-operative society and Society Registration Act 1860, Project proposal based on needs and resources.

Unit – IV Disaster Management: i) Pre-disaster, prevention, preparation and education; short term and long term perspectives. ii) Post-disaster management; rescue, relief and rehabilitation.

Unit – V Role of intervening parties: NGOs, VO, local groups, Community, Social Worker in Disaster Management.

Books Recommended:

1. Chandra,Murali V. (Ed.)- Role of Voluntary Organizations in Social Development, New Delhi: Sterling Publication.
2. Chaudhari D. Paul,(1983)- Social Welfare Administration, Delhi: Atma Ram .
3. Govt. of India- Co- Operative Societies Act 1912.
4. Govt. of India- Societies Registration Act 1860.
5. Joint Assistant Centre (1980)- Natural Disaster, New Delhi; Adhyatma Sadhana Kendra.
6. Norad (1998)- Guide to Planning and Evaluating NGO projects(Part II & III), Norway.
7. Wolfenstein, M.(1997)- Disaster: A Psychological Essay, New York: Arno Press.
8. N. Padhan – Encyclopaedia of Disaster Management (Text and Case Studies)
9. R.B. Singh – Natural Hazards & Disaster Management

OR

Any other Courses decided by BOCS and duly approved by Academic Council

OR

Any P.G. courses selected from SWAYAM and duly approved by Academic Council.

Annexure-II (iii)

Department of Economics
PATNA UNIVERSITY

Letter No. ECO/ 28 /24 Date 15/03/2024

To

The Deputy Registrar
Patna University, Patna.

Sub.: Regarding *Revised Syllabus of PG Degree Programme.*

Sir,

With reference to your letter no. Acad/ 131/ AKS-1862 dated 03.02.2024 on the above noted subject I am herewith sending revised syllabus of the PG Degree Programme of Economics.

This is for your information and necessary action.

S.O. Acad
18.03.24

Sri Ajay
19/03/24

Yours Sincerely,

15.3.2024
(Saroj Sinha)
Professor & Head
Head
Deptt. of Economics
Patna University

University Department of Economics
Patna University, Patna

Revised Syllabus : PG ECONOMICS

Sl No.	Paper Code	Paper Name	Recommendation to Add Topics	Recommendation to Delete Topics	Percentage Change
1	CC-1	Micro Economics Analysis-I		Utility Analysis Indifference Curve Analysis	
2	CC-2	Macro Economics Analysis-I	Elements and Method of calculating National Income Saving Function Neutrality and Non- Neutrality of Money- Transmission Mechanism Monetary Policy	Approaches of Macro Economics and Variables Control of Money Supply Quantity theory Approach Fisher's Equation	

15.3.2024
Head
Deptt. of Economics
Patna University

Sl No.	Paper Code	Paper Name	Recommendation to Add Topics	Recommendation to Delete Topics	Percentage Change
3	CC-3	Mathematical Methods			No Change
4	CC-4	History of Economic Thought	Neo- Classical and Keynesian School of Thought: Marshall, Keynes; Abhijeet Banerjee	Arrow Lewis C.N.Vakil and P.R. Brahamanand	
5	CC-5	Indian Economy-Issues and Polices-I	New Economic Policy, New Exim Policy, Farm Mechanisation, Organic Farming	National agenda for Governance and changing role of State	

15.3.2024
Head
Deptt. of Economics
Patna University

Sl No.	Paper Code	Paper Name	Recommendation to Add Topics	Recommendation to Delete Topics	Percentage Change
6	CC-6	Economics of Growth & Development-I	Theory of Critical Minimum Effort	Harrod- Domar Model	
7	CC-7	Micro Economics Analysis-II			
8	CC-8	Macro Economics Analysis-II	Mundell- Fleming Model	IS-LM Model in Open Economy Macro Stabilisation Policy	

15.3.2024
Head
Deptt. of Economics

Sl No.	Paper Code	Paper Name	Recommendation to Add Topics	Recommendation to Delete Topics	Percentage Change
9	CC-9	Statistical Methods		Measures of Central Tendency- Mean, Median and Mode Measures of Dispersion – Range, Quartile Deviation, Mean Deviation, Standard Deviation, Varinace, Coefficient of Variation, Skewness & Kurtosis	
10	CC-10	Indian Economy- Issues & Policies II	Provision of Urban Amenities in Rural Areas (PURA) Smart Cities: Objectives, Strategy and Present Position	Gender, Caste, Governance, Corruption	

15.3.2024
Head
Deptt. of Economics
Patna University

Sl No.	Paper Code	Paper Name	Recommendation to Add Topics	Recommendation to Delete Topics	Percentage Change
11	CC-11	Economics of Growth & Development -II	Causes and Features of Urbanisation in Developing Countries; Growth Centres-Satellite Towns		
12	CC-12	Public Economics	Club Goods, Local Public Goods, Lindahl Solution, Externalities and Regulation, Rational for State Intervention, Gender Budgeting, Cannon of Taxation, Fiscal Sector Reforms in India		

15.3.24
Head
Deptt. of Economics
Patna University

Sl No.	Paper Code	Paper Name	Recommendation to Add Topics	Recommendation to Delete Topics	Percentage Change
13	CC-13	International Economics	Leontief Paradox Foreign Trade Policy	Secular Stagnation Theory, Prebisch Singer Hypothesis Trade Deficit, Exim Policy Changing global Scenario Trade Barrier	
14	CC-14	Research Methodology			No Change

15.3.24

Head
Deptt. of Economics
Patna University

Sl No.	Paper Code	Paper Name	Recommendation to Add Topics	Recommendation to Delete Topics	Percentage Change
15	EC-1 Group-G	Financial Economics-I			
16	EC-1 Group-C	Econometrics	Basic Ideas of Time Series Analysis		

15.3.2024

As Per Need of Competitive Examinations
Revised Draft Syllabus

of

Post Graduate Degree Course under CBCS in Urdu

Each academic year will be divided into two semesters. In each Semester there will be 15 working teaching weeks (minimum 90 working days) and the remaining 5 weeks will be utilized for conduct of examination and evaluation purpose. Ist Semester will be normally from July to December and Second from January to June. There will be four papers in Ist Semester, five papers in II and III semesters and four papers in IV semester carrying 100 marks each (70 marks for written exam and 30 for continuous internal assessment). There will be five Units in each paper.

Ist Semester

Course Subjects

CC-I (DASTAN)

CC-II (NOVEL)

CC-III (MUKHTASAR AFSANA)

CC-IV (GHAIR AFSANVI NASR)

CC–1 (DASTAN)

Paper : 101

There will be five Units in this paper. The question paper will cover all the Units with the following pattern :

Part A –	Ten objective type Questions (Two Questions from each Unit)	-	10 x 2 = 20 Marks
Part B –	Five Question (Four to be answered) One short answer type Question from each Unit	-	4 x 5 = 20 Marks
Part C –	Five Questions (Three to be answered) One long answer type question from each Unit	-	3 x 10 = 30 Marks
Part D-	Internal Assessment		30 Marks

Syllabus:

Unit – 1	Fan-E-Dastan Goi aur Urdu Mein Dastan Goi Ka Irteqa
Unit – 2	Sab Ras by Mulla Wajhi
Unit – 3	Bagh-O-Bahar by Meer Amman
Unit – 4	Fasana-E-Ajaeb by Rajab Ali Beg Soroor
Unit – 5	Rani Ketki ki Kahani by Inshaullah Khan Insha

Books For Reference:

Fan-E-Dastan goi	-	Kalimuddin Ahmad
Hamari Dastanen	-	Waqar Azim
Urdu ki Nasri Dastanen	-	Gyanchand Jain
Rani Ketki ki Kahani Urdu Mein Murassa	-	Prof. Afghanullah Khan
Nasr Ki Rewayat	-	Mumtaz Ahmad Khan
Dastan Ki Sheryat (Volume-1)	-	S.R Farooqui

CC–II (NOVEL)

Paper : 102

There will be five Units in this paper. The question paper will cover all the Units with the following pattern :

Part A –	Ten objective type Questions (Two Questions from each Unit)	-	10 x 2 = 20 Marks
Part B –	Five Question (Four to be answered) One short answer type Question from each Unit	-	4 x 5 = 20 Marks
Part C –	Five Questions (Three to be answered) One long answer type question from each Unit	-	3 x 10 = 30 Marks
Part D-	Internal Assessment		30 Marks

Syllabus:

Unit – 1	Novel ka Fan aur Urdu mein Novel Nigari ka Irtequa
Unit – 2	Ibnul Waqt by Nazir Ahmad
Unit – 3	Umrao Jaan Ada by Mirza Md. Hadi Ruswa
Unit – 4	Gaudaan by Prem Chand
Unit – 5	Aiwan-E-Ghazal by Jeelani Bano

Books For Reference:

Biswin Sadi Mein Urdu Novel	-	Yusuf Sarmast
Novel Ka Fun	-	Abul Kalam Qasmi
Nazir Ahmad ki Novel Nigari	-	Ejaz Ali Arshad
Prem Chand ki Novel Nigari	-	Qamar Rais
Urdu Novel Azadi ke Baad	-	Aslam Azad
Umrao Jaan : Ek Mutaleya	-	Aadam Sheikh
Urdu ke Attharah Novel	-	Md. Hamid Ali Khan
Urdu Novel ke Asaleeb	-	Shahab Zafar Aazmi
Urdu Aur Hind Ke Syasi Novel: Taqabuli Motaleya	-	Suraj Deo Singh
Adabi Manzarname par Gaudaan	-	Quasim Khursheed
Jeelani Bano Ki Novel Nigari	-	Musharraf Ali

CC–III (MUKHTASAR AFSANA)

Paper : 103

There will be five Units in this paper. The question paper will cover all the Units with the following pattern :

Part A –	Ten objective type Questions (Two Questions from each Unit)	-	10 x 2 = 20 Marks
Part B –	Five Question (Four to be answered) One short answer type Question from each Unit	-	4 x 5 = 20 Marks
Part C –	Five Questions (Three to be answered) One long answer type question from each Unit	-	3 x 10 = 30 Marks
Part D -	Internal Assessment		30 Marks

Syllabus:

Unit – 1	Mukhtasar Afsane Ka Fan aur Urdu mein Mukhtasar Afsana Nigari ki Rewayat
Unit – 2	Kafan (Prem Chand), Apne Dukh Mujhe Dedo (Bedi) Adhe Ghante Ka Khuda (Krishna Chander), Sanobar ke Saaye (Hijab Imtiyaz Ali)
Unit – 3	Hatak (Saadat Hassan Manto), Chauthi ka Joda (Asmat Chugtai), Dain (Shakeela Akhtar)
Unit – 4	Badsoorat Ladki (Sohail Azimabadi), Babalog (Ghyas Ahmad Gaddi) Koile Wala (Akhtar Orainvi)
Unit – 5	Karman (Qurratul Ain Haider), Akhiri Aadmi (Intezar Hussain), Akhiri Koshish (Hayatullah Ansari)

Books For Reference:

Dastan se Afsane Tak	-	Yusuf Sarmast
Naya Afsana, Masael aur Imkanat	-	Qamar Rais
Urdu Afsana : Rewayat aur Masael	-	Gopi Chand Narang
Urdu Fiction aur Teesri Aankh	-	Wahab Ashrafi
Fanne Afsana Nigari	-	Waqar Azeem
Urdu Fiction ke Chand Zaviye	-	Ejaz Ali Arshad
Jahan-E-Fiction	-	Shahab Zafar Aazmi
Urdu Fiction ki Tanqeed	-	Irteza Karim

CC–IV (GHAIR AFSANVI NASR)

Paper : 104

There will be five Units in this paper. The question paper will cover all the Units with the following pattern :

Part A –	Ten objective type Questions (Two Questions from each Unit)	-	10 x 2 = 20 Marks
Part B –	Five Question (Four to be answered) One short answer type Question from each Unit	-	4 x 5 = 20 Marks
Part C –	Five Questions (Three to be answered) One long answer type question from each Unit	-	3 x 10 = 30 Marks
Part D -	Internal Assessment		30 Marks

Syllabus:

Unit – 1	Urdu mein Ghair Afsanvi Nasr (Non Fictional Prose) ki Rewayat aur Irteqa (i.e. Sawaneh / Khudnawisht, Tanz-o-Mazah, Khutoot, Khaka Nigari etc.)
Unit – 2	Hayat-E-Jawed by Altaf Hussain Hali
Unit – 3	Mazameen-E-Patras by Patras Bukhari
Unit – 4	Ghubar-E-Khatir by Abul Kalam Azad
Unit – 5	Ham Nafasan-E-Rafta by Rasheed Ahmad Siddiqui

Books For Reference:

Urdu ke Asaleeb-E-Bayan	-	Mohiuddin Qadri Zor
Urdu Adab mein Tanz-o-Mazah	-	Wazeer Agha
Urdu mein Khaka Nigari	-	Sabra Sayeed
Anjum Manpuri : Ahwal-o-Aasaar	-	Izhar Khizar
Rasheed Ahmad Siddiqui	-	Shahabuddin Saquib
Urdu Adab : ek Sadi	-	Syed Abdullah
Urdu ke Nasri Asaleeb	-	Shahab Zafar Azmi
Maulana Azad Number	-	Aiwan-E-Urdu, Delhi

2nd Semester

Course Subjects

CC-5 (URDU GHAZAL)

CC-6(URDU NAZM)

CC-7 (MASNAVI)

CC-8 (QASEEDA & MARSIA)

CC-9 (TAHQEEQ)

CC–V (URDU GHAZAL)

Paper : 201

There will be five Units in this paper. The question paper will cover all the Units with the following pattern :

Part A –	Ten objective type Questions (Two Questions from each Unit)	-	10 x 2 = 20 Marks
Part B –	Five Question (Four to be answered) One short answer type Question from each Unit	-	4 x 5 = 20 Marks
Part C –	Five Questions (Three to be answered) One long answer type question from each Unit	-	3 x 10 = 30 Marks
Part D -	Internal Assessment		30 Marks

Syllabus:

Unit – 1 Ghazal ka fan aur Urdu mein Ghazal Goi ki Rewayat, Ghazal ke Mukhtalif Dabistan, Ahde Hazir mein Urdu Ghazal

Unit – 2 **Wali**

(i) Yaad karna har ghadi us yaar ka...

(ii) Muflisi sab bahar khoti hai...

Meer:

(i) Faqeerana aaye sada kar chale

(ii) Hamare aage tera jab kaso ne naam liya

Dard:

(i) Jag mein aakar idhar udhar dekha...

(ii) Tuhmatein chand apne zimme dhar chale

Unit – 3 **Ghalib:**

(i) Naqsh faryadi hai kiski shokhi-E-tahreer ka...

(ii) Koi ummid bar nahin aati...

Momin:

(i) wo jo hum me tum me qarar tha tumhe yaad ho ke na yaad ho

(ii) Asar usko zara nahi hota

Daagh:

(i) Zaban hila do to ho jaye faisla dil ka

(ii) Ghazab kiya tere wade pe aietbar kiya

Unit – 4 **Yagana:**

(i)Khudi ka nasha chadha hosh me raha na gaya

(ii) Hunooz zindagi-E-talkh ka maza na mila

Aatash:

(i) Bada shor sunte the pehloo mein dil ka

(ii) ye aarzo thi tujhe gul ke roobaroo karte

Firaq:

(i) Sar mein Sauda bhi nahin dil mein tamanna bhi nahin

(ii) Na jane ashk se aankhon mein kyun hain aaye hue

Unit – 5 **Shad Azimabadi**

(i)Ab bhi ek umr pe jeene ka na andaaz aaya

(ii) Tadap aye dil tadapne se zara taskeen hoti hai

Hasrat Mohani

(i) Apna sa shauque auron mein layein kahan se hum

(ii) Hai mashque-E-sukhan jari chakki ki mushaqqat bhi

Nasir Kazmi:

(i) Kuch yaadgar-E-shahr-E-sitamgar hi le chalein

(ii)Hoti hai tere naam se wahshat kabhi kabhi

Books For Reference:

Ghazal aur Mutala-E-Ghazal	-	Ibadat Barelvi
Urdu Ghazal ke Pachaas Saal	-	Abdul Ahad Khan Khalil
Urdu Ghazal	-	Yusuf Hussain Khan
Dilli ka Dabistan-E-Shayri	-	Noorul Hassan Hashmi
Luckhnow ka Dabistan-E-Shayri	-	Abullais Siddiqui
Urdu Shayri Par Ek Nazar (Vol.-I, II)	-	Kalimuddin Ahmad
Humasar Urdu Shayri : Chand Zaviye	-	Ejaz Ali Arshad
Mutala-E-Shad	-	Ata Kakwi

CC–VI (URDU NAZM)

Paper : 202

There will be five Units in this paper. The question paper will cover all the Units with the following pattern :

Part A –	Ten objective type Questions (Two Questions from each Unit)	-	10 x 2 = 20 Marks
Part B –	Five Question (Four to be answered) One short answer type Question from each Unit	-	4 x 5 = 20 Marks
Part C –	Five Questions (Three to be answered) One long answer type question from each Unit	-	3 x 10 = 30 Marks
Part D -	Internal Assessment		30 Marks

Syllabus:

Unit – 1	Nazm nigari ka fan, Urdu mein nazm nigari ki rewayat aur rujhanaat
Unit – 2	Dilli Darbar (Akbar Ilahabadi), Admi Nama (Nazeer Akbarabadi), Mad-O-Jazar-E-islam (Haali)
Unit – 3	Awara (Majaz Lakhnvi), Badli ka Chand (Josh Malihabadi), Tanhai (Faiz Ad. Faiz)
Unit – 4	Ek Ladka (Akhtarul Iman), Aye Sharif Insan (Sahir Ludhyanvi)
Unit – 5	Charagar (Makhdoom Mohiuddin), Payam (Jameel Mazhari), Taslees – E-Haiyat (Perwez Shahidi)

Books For Reference:

Nazm-E-Jadeed ki Karwatein	-	Wazeer Aagha
Maasir Adab ke Pesh-rau	-	Md. Hassan
Jadeed Nazm : Hali se Meeraji Tak	-	Kausar Mazhari
Bihar ke Nazm Nigar Shora	-	Qamar Azam Hashmi
Akhtarul Iman ki Nazm Nigari	-	Shamshad Jahan
Nazeer Akbar Abadi ki Shayri mein Qaumi Yakjahti	-	Syed Aale Zafar
Sher Ghair Sher, aur Nasr	-	S.R Faruqui
Sahir Ludhyanvi Hayat Aur Karname-		Naghma Perween

CC–VII (Masnavi)

Paper : 203

There will be five Units in this paper. The question paper will cover all the Units with the following pattern :

Part A –	Ten objective type Questions (Two Questions from each Unit)	-	10 x 2 = 20 Marks
Part B –	Five Question (Four to be answered) One short answer type Question from each Unit	-	4 x 5 = 20 Marks
Part C –	Five Questions (Three to be answered) One long answer type question from each Unit	-	3 x 10 = 30 Marks
Part D -	Internal Assessment		30 Marks

Syllabus:

Unit – 1	Masnavi ka Fan aur Urdu Masnavi ka Ahad ba Ahad Irtequa
Unit – 2	Qutub Mushtari by Mulla Wajhi
Unit – 3	Sehrul Bayan by Meer Hassan
Unit – 4	Gulzar-E-Naseem by Daya Shankar Naseem
Unit – 5	Soz-o-Gudaz by Shauque Neemvi

Books For Reference:

Masnavi ka Fan aur Urdu Masnaviyan	-	Najmul Huda
Urdu Masnavi: Shumali Hind mein	-	Gyan Chand Jain
Urdu Masnavi ka Irtequa	-	Abdul Qadir Sarwari
Urdu ki teen Masnaviyan	-	Khan Rasheed
Soz-o-gudaz	-	Muzaffar Iqbal (Edited)
Qutub Mushtari	-	Wahab Ashrafi (Edited)

CC–VIII (Qaseeda & Marsia)

Paper : 204

There will be five Units in this paper. The question paper will cover all the Units with the following pattern :

Part A –	Ten objective type Questions (Two Questions from each Unit)	-	10 x 2 = 20 Marks
Part B –	Five Question (Four to be answered) One short answer type Question from each Unit	-	4 x 5 = 20 Marks
Part C –	Five Questions (Three to be answered) One long answer type question from each Unit	-	3 x 10 = 30 Marks
Part D -	Internal Assessment		30 Marks

Syllabus:

Unit – 1	(a) Qaseeda goi ka Fan aur Urdu mein Qasida (b) Marsia ka Fan aur Urdu mein Marsia
Unit – 2	Qaseeda-E-Sauda (Tazheek-E-Rozgar)
Unit – 3	Qaseeda-E-Zauque (Zahe Nishat Agar kijiye ise tahreer)
Unit – 4	Marsia-E-Anees (Jab karbala mein dakhla-E-shah-E-deen hua)
Unit – 5	Marsia-E-Shaad (Jab ho chuka musafir-E-Shab ka safar tamam)

Books For Reference:

Urdu Adab mein Qaseeda Nigari	-	Abu Md. Sahar
Urdu Qaseeda Nigari ka Tanqeedi Jayeza	-	Mahmood Ilahi
Urdu mein Qaseeda Nigari	-	Kamaluddin
Urdu Marsiya ka Irtequa	-	Masihuzzaman
Urdu Marsia Anees ke Baad	-	Suraiyya Jamal Mazhari
Qusidda Ki Sheryat	-	Jamia Millia Islamia, (Delhi)

CC–IX (Tahqeeq)

Paper : 205

There will be five Units in this paper. The question paper will cover all the Units with the following pattern :

Part A –	Ten objective type Questions (Two Questions from each Unit)	-	10 x 2 = 20 Marks
Part B –	Five Question (Four to be answered) One short answer type Question from each Unit	-	4 x 5 = 20 Marks
Part C –	Five Questions (Three to be answered) One long answer type question from each Unit	-	3 x 10 = 30 Marks
Part D -	Internal Assessment		30 Marks

Syllabus:

Unit – 1	Tahqeeq Ka Fun aur Uski Rewayat
Unit – 2	Tahqeeq ke Mabadiat aur Uske Tariqua –E- Karr
Unit – 3	Tahqeeq-o-Tanqeed ka rishta
Unit – 4	Tahqeeque aur Tadween-E-matan
Unit – 5	Urdu ke Chand Aham Muhaqqeqin (Qazi Abdul Wadood, Rasheed Hassan Khan, Tanweer Ahmad Alvi, Usloob Ahmad Ansari, Mahmood Sheerani)

Books For Reference:

Usool-E-Tahqeeque-o-Tarteeb-E-Matan	-	Tanweer Ahmad Alvi
Maqalat-E-Qazi Abdul Wadood	-	Kalimuddin Ahmad
Tahqeeq-o-Tanqeed	-	Asloob Ahmad Ansari
Tahqeequ ka Fan	-	Gyan Chand Jain
Adabi Tahqeeq : Masael aur Tajzia	-	Rasheed Hasan Khan
Bazyaft	-	Mahmood Ilahi
Maqalat-E-Sheerani	-	Maqalat-E-Sheerani
Qazi Abdul Wadood Seminar mein Padhe Gaye Maqale	-	Bihar Urdu Academy
Urdu mein Adabi Tahqeeque ke bare mein	-	Khuda Bakhsh OP Library
Meyar-E-Tahqeeque (Vol.-II)	-	Khuda Bakhsh OP Library
Tahqeeque Ke Tariqa-E-Kar	-	Sheen Akhtar

3rd Semester

Course Subjects

CC-10 (TANQEED)

CC-11(TAHREEKAT-O-RUJHANAT

CC-12 (BIHAR KA ADABI DABISTAN)

CC-13(LESANIYAT AUR AROOZ-O- BALAGHAT)

CC-14(STUDY OF IQBAL & GHALIB

CC–X (Tanqeed)

Paper : 301

There will be five Units in this paper. The question paper will cover all the Units with the following pattern :

Part A –	Ten objective type Questions (Two Questions from each Unit)	-	10 x 2 = 20 Marks
Part B –	Five Question (Four to be answered) One short answer type Question from each Unit	-	4 x 5 = 20 Marks
Part C –	Five Questions (Three to be answered) One long answer type question from each Unit	-	3 x 10 = 30 Marks
Part D -	Internal Assessment		30 Marks

Syllabus:

Unit – 1	Urdu mein Tazkera Nigari ki Rewayat with special reference to Aab-E-Hayat
Unit – 2	Tanqeed aur Mukhtalif Dabistan-E-Tanqeed
Unit – 3	Muqadma-E-Sher-o-Shayri by Khwaja Altaf Hussain Hali
Unit – 4	Mawazna-E-Anees-o-Dabeer by Shibli Nomani
Unit – 5	Urdu Tanqeed Per Ek Nazar by Kalimuddin Ahmad

Books For Reference:

Urdu Tanqeed Par ek Nazar	-	Kalimuddin Ahmad
Amali Inteqadiyat	-	Syed Md. Aquil Rizvi
Urdu ka Dabistan-E-Tanqeed	-	Saleem Akhtar
Jadeed Urdu Tanqeed: Usool -o-Naqariyat	-	Sharib Radaulvi
Qadeem Adabi Tanqeed	-	Wahab Ashrafi
Urdu Tanqeed ka Irtequa	-	Ibadat Barelvi
Fanne Tanqeed aur Tanqeedi Mazameen	-	Najmul Hoda
Matn aur Mukalma	-	Quasim Khursheed
Matn, Maani aur Theory	-	Quddus Jawaid
Kalimuddin Ahmad (Monograph)	-	Shahab Zafar Azmi

CC–XI (Tahreekat-O-Rujhanat)

Paper : 302

There will be five Units in this paper. The question paper will cover all the Units with the following pattern :

Part A –	Ten objective type Questions (Two Questions from each Unit)	-	10 x 2 = 20 Marks
Part B –	Five Question (Four to be answered) One short answer type Question from each Unit	-	4 x 5 = 20 Marks
Part C –	Five Questions (Three to be answered) One long answer type question from each Unit	-	3 x 10 = 30 Marks
Part D -	Internal Assessment		30 Marks

Syllabus:

Unit – 1	Urdu ki Ibtedai Nasho-numa mein Sufia-E-Keram aur Dakan ki Khidmaat
Unit – 2	Fort William College
Unit – 3	Aligarh Tahreek
Unit – 4	Taraqqui Pasand Tahreek with special reference to poetry, fiction and criticism
Unit – 5	(a) Jadeediat (b) Mabaad-E-Jadeediyat

Books For Reference:

Urdu ki Ibtedai Nasho-numa mein Sufia-E-Keram ka Hissa	-	Abdul Haque
Urdu ki Adabi Tahreekein	-	Anwar Sadeed
Fort William College ki Adabi Khidmaat	-	Iffat Zarrein
Sir Syed aur unke Namwar Rofaqua	-	Syed Abdullah
Ahad-E-Sir Syed ky Adabi wo Ilmi Noqush	-	Safdar Imam Quadri
Taraqqui Pasan Adab ka Pachhas sala safar	-	Qamar Rais /Aashoor Kazmi
Urdu mein Taraqqui Pasand Adabi Tahreek	-	Khaleelur Rahman Azmi
Jadeediyat ki Jamaliyat	-	Lutfur Rahman
Mabaad-E-Jadeediyat: Muzmerat-o-Mumkenat-		Wahab Ashrafi
Urdu Adab Taraqqui Pasndi Se Jadidiyat Tak		Tauqeer Alam

CC–XII (Bihar Ka Adabi Dabistan)

Paper : 303

There will be five Units in this paper. The question paper will cover all the Units with the following pattern :

Part A –	Ten objective type Questions (Two Questions from each Unit)	-	10 x 2 = 20 Marks
Part B –	Five Question (Four to be answered) One short answer type Question from each Unit	-	4 x 5 = 20 Marks
Part C –	Five Questions (Three to be answered) One long answer type question from each Unit	-	3 x 10 = 30 Marks
Part D -	Internal Assessment		30 Marks

Syllabus:

Unit – 1	Dabistan-E-Bihar ki Tashkeel-o-Tameer
Unit – 2	Bihar mein Urdu Shaeri with special reference to Rasikh, Kalim Ajiz, Hasan Nayeem
Unit – 3	Bihar mein Urdu Fiction with special reference to Rashidatunnisa (Islahunnisa), Akhtar Orainvi (Shakur Dada), Sohail Azimabadi (Bejad ke Paude)
Unit – 4	Bihar mein Urdu Tanqeed with special reference to Imdad Imam Asar (Kashiful Haqaeque), Kalimuddin Ahmad (Urdu Shaeri Per Ek Nazar), Wahab Ashrafi (Aagahi ka Manzar Nama), Ejaz Ali Arshad (Bihar me Urdu Tanqid)
Unit – 5	Bihar mein Ghair Afsanvi Nasr with special reference to Anjum Manpuri (kiraye ki Tamtam), Syed Md. Husnain (Hero), Jahan Khushboo hi Khushboo thi (Kaleem Ajiz), Bazm-E-Raftagan (Vol. 1) Sabahuddin Abdur Rahman, Hayat-Shibli (Syed Suleman Nasvi)

Books For Reference:

Bihar ki Bahaar	-	Ejaz Ali Arshad
Akhtar Shanasi	-	Arshad Masood Hashmi
Bihar mein Urdu Zaban-o-Adab ka Irtequa	-	Akhtar Orainvi
Bihar mein Urdr Nasr ka Irtequa	-	Muzaffar Iqbal
Bihar mein Urdu Nazm Nigari	-	Qamar Azam Hashmi
Bihar mein Urdu Tazeranigari	-	Mansoor Alam
Bihar mein Urdu Shayri 1857 tak	-	Syed Shah |Haseen Ahmad
Matan aur Maana	-	Shahab Zafar Aazmi
Sabahuddin Abdurrahman	-	Hamid Ali Khan
Anjum Manpuri	-	Izhar Khizar
Inshaiya aur Chand Inshaiye	-	Syed Md. Husnain
Bihar me Urdu Novel Nigari 1980 Ke Baad	-	Rais Anwar

CC–XIII (Lesaniyat Aur Arooz-O-Balaghat)

Paper : 304

There will be five Units in this paper. The question paper will cover all the Units with the following pattern :

Part A –	Ten objective type Questions (Two Questions from each Unit)	-	10 x 2 = 20 Marks
Part B –	Five Question (Four to be answered) One short answer type Question from each Unit	-	4 x 5 = 20 Marks
Part C –	Five Questions (Three to be answered) One long answer type question from each Unit	-	3 x 10 = 30 Marks
Part D -	Internal Assessment		30 Marks

Syllabus:

Unit – 1	Lesaniyat ki tareef, Iske daira-E-kaar aur deegar uloom se rishta
Unit – 2	(a) Zubaanon ke Aalami khandaan (b) Zubaanon ka Hind Aaryai Khandaan
Unit – 3	(a) Urdu zaban ki ibteda ke mukhtalif nazariyat with special reference to Masood Hussain Khan, Mahmood Shirani and Mohiuddin Qadri Zor (b)Zaban ki iradi aur ghair iradi tashkeel, Sauti Taghaiur-o-Tabaddul, Waza-E-Istelahat, Sabqe aur Lahque
Unit – 4	Balaghat: Tareef aur Aqsaam- Tashbeeh, Isteyara, Kanaya, Majaz, Talmeeh, Ieham, Mubalgha, Gholu, Husn-E-Taleel, Tajahul-E-Aarfana, Laf-o-Nashr, Maratunnazeer
Unit – 5	Arooz: Rukn, Sabab, Watad, Fasla, Wazn, Bahar (Salim & Mazahif), Salim Bahron ki Mukhtalif Qismein aur Taqtei

Books For Reference:

Muqadma-E-Tareekh-E-Zaban-E-Urdu	-	Masood Hussain Khan
Zaban aur Ilm-E-Zaban	-	Abdul Qadir Sarwari
Urdu ki Lesani Tashkeel	-	Mirza Khalil Beg
Lesani Tanazur	-	Mirza Khalil Beg
Lesani Mutaleya	-	Gyan Chand Jain
Waza-E-Istalehat	-	Waheeduddin Saleem
Jadeed Ilmul Balaghat	-	Abdul Majeed
Ilmul Arooz	-	S.M Sadruddin
Ilmul Arooz	-	Azimur Rahman

CC–XIV (Study of Iqbal & Ghalib)

Paper : 305

There will be five Units in this paper. The question paper will cover all the Units with the following pattern :

Part A –	Ten objective type Questions (Two Questions from each Unit)	-	10 x 2 = 20 Marks
Part B –	Five Question (Four to be answered) One short answer type Question from each Unit	-	4 x 5 = 20 Marks
Part C –	Five Questions (Three to be answered) One long answer type question from each Unit	-	3 x 10 = 30 Marks
Part D -	Internal Assessment		30 Marks

Syllabus:

Unit – 1	Iqbal, Shakhsiyat aur Ahwal-o-Aasaar
Unit – 2	Iqbal ke nazariyat-o-afkar (Khudi, Mard-E-Momin, Ishq, Aurat, Fun)
Unit – 3	Iqbal ki paanch nazmein (1.Hemala, 2.Naya Shiwala, 3.Masjid-E-Qurtuba, 4.Zauq-o-Shauq, 5.Jibril-o-Iblis)
Unit – 4	Ghalib ki Ghazal Goi (Sahl goi, Muskil Pasandi, Buland Khyali, Tashkeek
Unit – 5	Ghalib ki Maktoob Nigari with special reference banam Meer Mehdi Majrooh & Mirza Tufta

Books For Reference:

Rooh-E-Iqbal	:	Yusuf Hussain Khan
Iqbal ka Nezam-E-Fan	:	Abdul Moghni
Iqbal Shair aur Danishwar	:	Mumtaz Ahmad Khan
Iqbal Bahaisiyat Shair	:	Rafiuddin Hashmi
Iqbal : Asari Tanazur	:	Manzar Ejaz
Iqbal : Ek Mutaleya	:	Kalimuddin Ahmad
Yaadgar-E-Ghalib	:	Altaf Hussain Hali
Mahasin-E-Kalam-E-Ghalib	:	Abdurrahman Bijnauri
Zikr-E-Ghalib	:	Malik Ram
Shakeelur Rahman ki Ghalib		
Ghalib Ki Jamaliat	:	Shakeelur Rahman

4th Semester

Course Subjects

EC-1(A) (ASARI ADAB)

EC-1(B) (SAHAFAT)

EC-1(C) (TARJUMA NIGARI)

EC-1(D) (TASAWWUF)

EC-1(E) (DRAMA)

Any one of the above will be selected

EC–I (A) (Asari Adab)

Paper : 401

There will be five Units in this paper. The question paper will cover all the Units with the following pattern :

Part A –	Ten objective type Questions (Two Questions from each Unit)	-	10 x 2 = 20 Marks
Part B –	Five Question (Four to be answered) One short answer type Question from each Unit	-	4 x 5 = 20 Marks
Part C –	Five Questions (Three to be answered) One long answer type question from each Unit	-	3 x 10 = 30 Marks
Part D -	Internal Assessment		30 Marks

Syllabus:

Unit – 1	Shayri with special reference to Shaharyaar, Mazhar Imam, Perween Shakir, Sultan Akhtar
Unit – 2	Novel with special reference to Abdus Samad(do gaz zameen), Pokemon ki Duniya(Musharraf Alam Zauqui), Barf Ashna Parinde (Tarannum Reyaz), Amawas Mein Khwab (Hussainul Haque)
Unit – 3	Afsana with special reference to Bade Saba ka Intezar (Syed Md Ashraf), Ek Chhota sa Jahannum(Sajid Rasheed), Gumbad ke Kabootar (Shaukat Hayat), Fazlu Baba Tikhtikh (Zakiya Mashhadi)
Unit – 4	Tanz-o-Mazah with special reference to Qata Kalam (Mujtaba Hussain), Zarguzasht (Mushtaque Yusufi), Filhaal (Yusuf Nazim), Wahiyat (Raza Naqvi Wahi)
Unit – 5	Tanqeed with special reference to Shamsurrahman Farooqui, Gopi Chand Narang, Shakeelur Rahman, Abdul Moghni

Books For Reference:

Humasar Urdu Novel	-	Qamar Rais
Urdu Fiction : Hindustan mein	-	Hussainul Haque
Nai Urdu Ghazal	_	Sarwarul Hoda
Beeswein Sadi mein Urdu Tanz-o-Mazah	-	Nami Ansari
Humasar Urdu Shayri : Chand Zaviye	-	Ejaz Ali Arshad
Bihar mein Urdu Tanz-o-Zarafat	-	Sultan Azad
Bihar Mein Takhleeqi Nasr	-	Qayam Nayer
Shakeelur Rahman Ki Ghalib Shanasi	-	Arshad Masood Hashmi

EC–I (B) (Sahafat)

Paper : 401

There will be five Units in this paper. The question paper will cover all the Units with the following pattern :

Part A –	Ten objective type Questions (Two Questions from each Unit)	-	10 x 2 = 20 Marks
Part B –	Five Question (Four to be answered) One short answer type Question from each Unit	-	4 x 5 = 20 Marks
Part C –	Five Questions (Three to be answered) One long answer type question from each Unit	-	3 x 10 = 30 Marks
Part D -	Internal Assessment		30 Marks

Syllabus:

Unit – 1	Sahafat aur uski Mubadiyat
Unit – 2	Urdu Sahafat ki Tareef
Unit – 3	Bihar mein Urdu Sahafat
Unit – 4	Idaria Nigari, Column Nigari, aur Feature Nigari
Unit – 5	Amli Mashque (Practical)

Books For Reference:

Mubadiyat-E-Sahafat	:	Jawed Hayat
Bihar mein Urdu Sahafat	:	Syed Ahmad Quadri
Rahbar-E-Akhbar Naweesi	:	Iqbal Quadri
Sahafat Kya Hai	:	Iqbal Hussain
Zaraye Tarseel-o-Iblagh	:	Syed Shamim Ahmad

EC–I (C) (Tarjuma Nigari)

Paper : 401

There will be five Units in this paper. The question paper will cover all the Units with the following pattern :

Part A –	Ten objective type Questions (Two Questions from each Unit)	-	10 x 2 = 20 Marks
Part B –	Five Question (Four to be answered) One short answer type Question from each Unit	-	4 x 5 = 20 Marks
Part C –	Five Questions (Three to be answered) One long answer type question from each Unit	-	3 x 10 = 30 Marks
Part D -	Internal Assessment		30 Marks

Syllabus:

Unit – 1	Tarjume ka Fan aur Rewayat
Unit – 2	Tarjuma ki Ahmiyat wo Afadiyat
Unit – 3	Farsi se Urdu Tarjuma & Vice Versa
Unit – 4	Angrezi se Urdu Tarjuma & Vice Versa
Unit – 5	Hindi se Urdu Tarjuma & Vice Versa

Books For Reference:

Tarjuma ka Fan aur Rewayat	:	Qamar Rais
Tarjume ke Buniyadi Masael	:	Zo. Ansari

EC–I (D) (Tasawwuf)

Paper : 401

There will be five Units in this paper. The question paper will cover all the Units with the following pattern :

Part A –	Ten objective type Questions (Two Questions from each Unit)	-	10 x 2 = 20 Marks
Part B –	Five Question (Four to be answered) One short answer type Question from each Unit	-	4 x 5 = 20 Marks
Part C –	Five Questions (Three to be answered) One long answer type question from each Unit	-	3 x 10 = 30 Marks
Part D -	Internal Assessment		30 Marks

Syllabus:

Unit – 1	Tasawwuf kya hai
Unit – 2	Tasawwuf Ahad ba Ahad
Unit – 3	Aham Soofiya-E-Karaam (Abdul Qudir Jilani, Khwaja Gharib Nawaz Neizamuddin Aulia Sharfuddin Yahya Maneri)
Unit – 4	Tasawwuf ke Nazariyat (Wahdatul Wajood , Wahdatul Shahood , Ishq / Prem Marg
Unit – 5	Urdu Shayri mein Tasawwuf

Books For Reference:

Kashful Mahjoob	:	Ali Hajweri
Ahyaul Uloom	:	Sheikh Mohiuddin Alwi
Tafheem Tasawwuf	:	Hussainul Haque
Tasawwuf Ahad ba Ahad	:	Syed Shah Haseen Ahmad
Bihar ki Sufiyana Shayri	:	Taiyab Abdali
Tareekh, Mashaekh Chist	:	Khaleeque Ahmad Nizami

EC–I (E) (Drama)

Paper : 401

There will be five Units in this paper. The question paper will cover all the Units with the following pattern :

Part A –	Ten objective type Questions (Two Questions from each Unit)	-	10 x 2 = 20 Marks
Part B –	Five Question (Four to be answered) One short answer type Question from each Unit	-	4 x 5 = 20 Marks
Part C –	Five Questions (Three to be answered) One long answer type question from each Unit	-	3 x 10 = 30 Marks
Part D -	Internal Assessment		30 Marks

Syllabus:

Unit – 1	Drama ka Fan aur Ajzae-tarkibi
Unit – 2	Drame ke Aqsaam (Stage, Radio, TV, Nukkad Natak)
Unit – 3	Sanskrit aur Yunani Drama : Ek Taarruf
Unit –4	Urdu mein Drama Nigari with special reference to Indrasabha(Amanat Lakhnawi), Khana Jangi (Md. Mujeeb), Parda-E-Ghaflat (Abid Hussain), Modern Anarkali (Shafi Mashhadi)
Unit – 5	Bihar ka Stage aur Urdu Drama

Books For Reference:

Urdu Drama	:	Ishrat Rahmani
Drama: Fan aur Rewayat	:	Md. Shahid Hussain
Bihar ka Urdu Stage aur Urdu Drama	:	Syed Hassan
Radio Drama ke Asnaf	:	Akhlaque Asar
Radio Drama : Rewayat aur Tajurba	:	Akhlaque Asar
Muthi Bhar Khwab	:	Shafi Mashhadi

EC-II

Project work and Practical

50 marks each

EC–II (Project & Presentation)

Paper : 402

Group (A) Theory

Assignment will be given on different topics to each student as a project work. The project will be of fifty marks.

Group (B) Practical

Each Student have to make presentation on the topic of their project . This paper will be of fifty marks.

Besides the presentation each student have to be trained in Urdu Computing.

GE-I

Student of any faculty can Opt CC-5 as general elective